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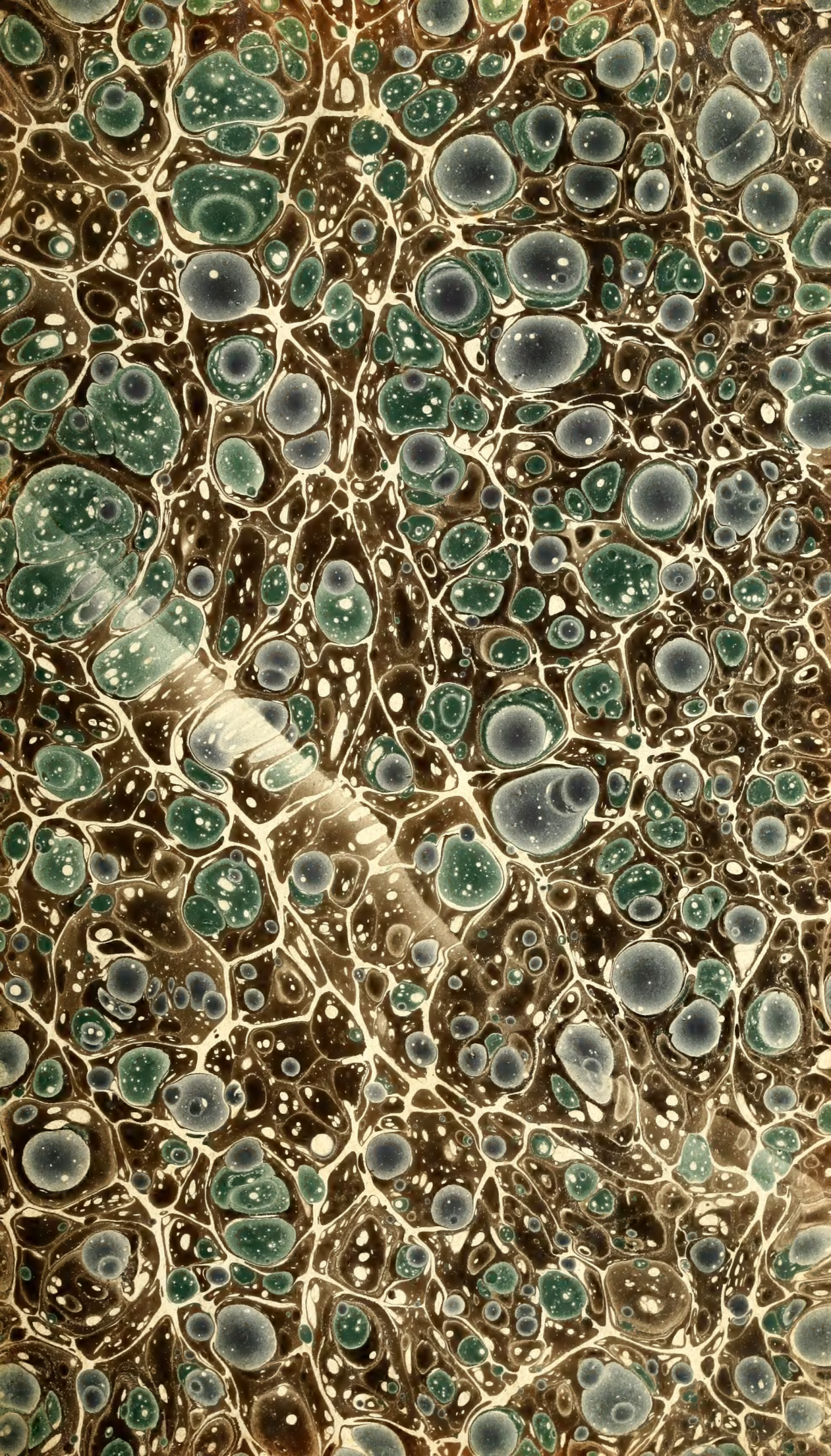

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CHESAPEAKE AND OHIO CANAL COMPANY.

January 14, 1833.
Referred to the Committee for the District of Columbia.

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To the Senate and House of Representatives of the United States of America in Congress assembled:

The memorial of the Chesapeake and Ohio Canal Company, by their undersigned president and directors, while it embraces this occasion to renew their prior memorials to your honorable body, most respectfully represents: That, since the commencement of the present year, the canal committed to their care, after surmounting the legal obstacles which impeded its progress, beyond the first mountain which it encountered in ascending the valley of the Potomac, has been placed under contract, as far up its long designated route, as eight miles above the town of Williamsport, in the State of Maryland. At this point, a dam is erecting across the Potomac, which will extend the improved navigation eight miles further up the river, by means of a pond of still water, affording no where a depth of less than six feet.

When the works now under contract shall have been completed, they will comprehend 102 miles of canal, and 15 of still water navigation, adapted to boats of 100 tons burden.

For the construction of the 14 miles of this canal next above the Point of Rocks, at the eastern base of the Catoctin mountain, contracts were made in February and March; for the succeeding 22½ miles, on the 2d of June; and, for the last 15 miles, on the 23d of August, being as early as practicable after the final decision, by the Court of Appeals of Maryland, of the long depending controversy between your memorialists and the Baltimore and Ohio Railroad Company, for the occupation of the left bank of the Potomac; that bank which had been early and uniformly recommended by experienced engineers as affording the best site for a canal, on account as well of its southern exposure, as of the superior facilities which, on careful examination, it had been found to offer for the construction of such a work. The earliest of the preceding contracts provided for a supply of water by a feeder from Harper's Ferry falls to the 26 miles of canal immediately below the Point of Rocks; which, although nearly finished, the above controversy had long withheld from public use, and rendered a source of unrequited expense to your memorialists.

Extending from the head of those falls down to the 26 miles next above the Seneca feeder, this line is calculated, by means of a lift lock immediately opposite to the mouth of the Shenandoah, for the ready admission into the

canal of the boats which navigate that river; while it will remove the greatest remaining obstruction to the navigation of the Potomac, by overcoming, in the vicinity of Harper's Ferry, a descent of near 32 feet in the space of three miles.

This part of the new work, it is now confidently believed, will be ready for use early in May next. The contracts for its construction required its completion by the 1st of December last; but, suspended in its progress for several weeks of the past autumn by the prevalence of the cholera, although its excavation and embankments will be completed during the present winter, a part of its masonry will have to await a few weeks of open weather in the ensuing spring.

The 37½ miles of canal above the head of Harper's Ferry falls consists of two parts, which were placed under contract at two different periods. They comprehend two distinct feeders from the Potomac The first 22½ miles derive a supply of water from a pond, created by a dam now constructing across this river, two miles below the mouth of Opæcon, and the remaining 15 miles, from a similar dam, situated 22 miles above the last, and eight miles above Williamsport.

The fatal disease which had spread alarm throughout the world, having reached the valley of the Potomac shortly after the abovementioned contracts were made, their execution was suspended during the most profitable season for labor; but the contractors for the most difficult sections of the new work continue to express entire confidence in their ability to complete it by the first day of September next, the period stipulated in their contracts; and the vigor with which they have embraced the opportunity afforded by the disappearance of the cholera, to renew their operations, favored by the recent discharge of labor from several extensive works in the adjacent States, affords sufficient ground for this confidence. From the last weekly returns, by the several assistant engineers, of the force applied to the various works under contract, it appears that there were employed 4,300 mechanics and laborers, 807 horses, mules, and oxen, together with 6,900 pounds of gunpowder; and that this force was daily augmenting.

On the third day of the present month, down to which the last treasury report brought the receipts and disbursements of the company, there had been collected of the subscribed stock of the company, payable in money, the sum of $2,527,021, which, deducted from the original subscription, left to be collected, the further sum of $1,082,179. This amount, added to the cash on hand at that date, $168,287 45, made the aggregate resources of the company, for the completion of all the works under contract, $1,250,466 45, exclusive of the nett amount of tolls for the current year, after deducting the cost of repairs and collections, which may safely be computed at $31,500.

In the annexed exhibit, this last amount is estimated at less than the gross sum received in the last year from the 22½ miles of canal in use; the extension o the navigation, by opening during the ensuing spring, as is now confidently anticipated, the entire line below the head of Harper's Ferry falls, being required in this estimate to do no more than to defray the expenses of repairs, lock-keepers, and collectors, upon the 64½ miles which will then be in onstant public use.

For the application of the preceding resources, and the evidence of their competency to fulfil all the existing contracts of the company, your memorialists refer to the accompanying exhibit, (A) which had been prepared a month ago, with great circumspection and labor, both on the part of

the engineers and the officers of the company, with a view to their future operations.

It will be seen from the result with which it closes, that the first 102 miles of the canal are expected to cost, without any deduction for numerous expenditures, not strictly chargeable to its construction, very near $35,000 a mile. This sum is, however, 30 per cent. less than the estimated cost of the same line of canal by the United States' engineers, when its breadth was computed to be only 48 feet at the surface of the water, its depth only 5 feet below it, its tow path to be but 9 feet, and its berm bank 5 feet wide at the top. The actual canal, on the other hand, has, for the first 64½ miles, a breadth, for very short distances, reduced a few feet below, for much greater distances, much enlarged beyond 60 feet, and has no where less than 6 feet depth of water, with a tow path 12, and a berm bank 8 feet wide at top. These dimensions, which continue to the head of Harper's Ferry falls, are preserved above, except that, in all thorough cuts, steep hill side cutting, and difficult rock excavation, it has been deemed expedient to reduce its breadth at the water surface to 50 feet. In the former estimate, moreover, no allowance was made for land rights, nor for the salaries of officers and engineers, and other contingencies, amounting, as experience has shown, to $250,000, all of which are included in the annexed exhibit of the cost of the 102 miles of canal.

Had not the competition for labor, by which its cost to the contractors was augmented, after the first contracts, in 1828, more than 30 per cent., swelled the price of its various works, the canal already constructed and under contract might have been completed for half the sum at which it was estimated by those engineers, notwithstanding its increased dimensions.

The 37½ miles above the head of Harper's Ferry falls, which were let, under circumstances somewhat more favorable, from the suspension of the neighboring works on the Baltimore and Ohio railroad; the completion of the Juniata canal of Pennsylvania; and the near completion of the great canal of Ohio, are confidently expected to cost less than $27,000 per mile. Yet these 37½ miles comprehend two considerable aqueducts of stone, 42 culverts, and 10 lift locks; with two guard locks and elevated dams across the Potomac, estimated, together, at very near $120,000.

Your memorialists believe, therefore, that the cost of the remaining eighty-four miles of the eastern section of the canal may be computed at $25,000 a mile, supposing no reduction of its present dimensions, or of the solidity and strength of its various works.

Having, however, complied with all the provisions of their charter, by placing under contract 102 miles of canal, and endeavoring to complete them within five years from its commencement, notwithstanding the legal obstructions by which they were deprived of three and a half years of that period, they propose a plan of completing the residue, alike expedient, and consistent with the remaining obligations of their charter.

This allows, for the completion of the entire eastern section, twelve years from its commencement; so that, adding three and a half years for the time that the company have been obstructed in their labor by the interposition of the legal authority of one of the parties to their charter, the whole period, applicable to this end, is fifteen and a half years; which would carry forward the time that may lawfully be consumed in completing this section of 186 miles, to the 5th of October, 1843.

Supposing that the contractors, now at work, fulfil their engagements—102 miles of this section will, however, have been finished and in public use, before the 1st of October next; and should the plan, proposed in the accompanying exhibit, (marked B,) meet with adequate support, 58 miles of additional canal, and 20 miles of still water, will have carried the navigation of the Potomac, with a depth of water suited to one hundred ton boats, to nine miles beyond Cumberland, by the fall of 1835; that is, in a period less, by fifteen months, than the time allowed by the charter, for the completion of 100 miles of canal.

This result supposes the augmentation of the funds of the Chesapeake and Ohio Canal Company by the subscription of $1,440,000.

After the collection and disbursement of this sum, there will remain a few short intervals of still water, no one exceeding 9 miles in extent, to be substituted by short canals, uniting and continuing one uninterrupted line of uniform navigation, up to the feeder, a mile above Cumberland. And, for this last labor, there will remain, unexpired, five years of the period allowed by the charter, should no further time be claimed by the company on account of the legal obstructions which impeded their progress for three and an half years.

The annexed exhibit distributes, into three distinct parts, the residue of the eastern section of the canal, after the part, now under contract, shall have been finished.

The first of these three subdivisions, as well as the most important, will be the extension of the improved navigation, from the dam, eight miles above Williamsport, to a point nine miles above the mouth of the Cacapon, by means of a dam, which will cause the water of the Potomac to back up that branch, now navigable, in high floods, for sixty miles, to the common boundary of the counties of Hardy and Hampshire, in Virginia; and a canal of seventeen and a half miles only, by connecting the still water, above this dam, with that occasioned by the dam next below it, will add to the 117 miles of improved navigation, 26½ miles more, at an expense not exceeding $350,000.

The second part of the proposed plan contemplates the erection of a dam, less elevated than the last, immediately below the mouth of the South Branch of the Potomac, and a canal, extending thence, a distance of 25½ miles, to the head of the basin of still water formed by the dam at the mouth of the Cacapon.

This last dam will cause back water a considerable distance up the South Branch, and three miles up the main river, to the foot of Alum Hill, fourteen miles only, below Cumberland. The cost of this work would probably require the expenditure of $570,000, while it added 28½ miles to the improved navigation.

The third and last part of the plan, here proposed, comprehends a dam across the Potomac, at a ledge of rocks one mile above Cumberland, and a canal passing thence, through Cumberland, and by an aqueduct elevated 31 feet above the surface of Wills's creek, a distance, in all, of 15½ miles, to the next basin of still water, at the foot of Alum Hill. Allowing for the great elevation of this dam, this aqueduct over Wills's creek, and the expense of passing through the town of Cumberland, the construction of eleven locks, and some deep cutting, this part of the canal will probably cost $520,000.

On the completion of these various works, boats laden, each with 2,800 bushels of coal or lime, with 1,000 barrels of flour, 50 cords of fire wood, or 100 tons of lumber, when not impeded by ice, may descend from the bosom of the forests, and the vicinity of the coal banks on the head waters of the Potomac, and, passing through Cumberland, reach, in seven days, at an expense of $35, the markets of the Potomac on tide water. Their return, if empty, will add $35 more to the cost of their freight, making the cost of carriage, exclusive of tolls, $70, for the entire voyage of near 400 miles; which, if charged upon the descending cargo alone, will average seventy cents per ton, or 2½ cents the bushel of coal. If to this be added the toll, which will probably be charged upon so cheap a commodity, of a cent a ton per mile, the total cost of transportation and tolls from Cumberland to Washington, a distance of 186 miles, for 28 bushels, the quantity contained in a ton, will be 256 cents, or 9¼ cents per bushel of 80 pounds weight. The present price of coal at Cumberland varies from 6 to 8 cents the bushel, but by an improvement, now making, of the road leading to the nearest coal mines, this price will be reduced to less than a moiety of the largest of these sums, so as to be afforded, at the landing of the boat, for one dollar a ton. And to reduce the cost of this valuable fuel in the District of Columbia from 30 or 40 cents a bushel, its lowest price at present, to 15 cents, and yet leave to the coal merchant a reasonable profit.

The completion of the dams at the mouth of the Cacapon and the South Branch, and of the proposed canals below them, will, at the expense of $920,000, extend the navigation of the Potomac, for 100-ton boats, to within 14 miles of Cumberland; and, consequently, above the cultivated borders to the heart of the forests of Virginia, Maryland, and Pennsylvania. A door will thus be promptly opened to an extensive trade in lumber for building and enclosures; in lime for manure as well as cement; and in all the universal productions of the most mountainous regions of the central States of the Union.

Should the additional subscriptions fail, which are now invited from the States of Maryland and Virginia, those canals, with their basins of intervening still water, will leave but 14 miles of the entire navigation between the City of Washington and Cumberland to be improved for 100 tow boats; and will supply ample resources, in their tolls, constantly increasing, for the substitution, in time, of canals, for these short basins of still water; and, thus provide, for the continuation of a line of uniform navigation to a point one mile above Cumberland, according to the plan proposed in the accompanying exhibit.

While the western section of the canal is awaiting similar efforts for its commencement and completion, the eastern section, already finished, will reduce the portage between Brownsville, on the Monongahela, and the permanent navigation of the Potomac, to 72 miles of excellent macadamized road, charged with no other tolls than may be found necessary to keep it in repair.

A transfer may then be expected of the commerce of this national highway, to the channel afforded by the valley of the Potomac, at least, as far down that valley, as the Point of Rocks, where, in proceeding towards a market, it will meet the competition of 67½ miles of the Baltimore and Ohio rail road with 50 miles of continuous water transit by a canal; on which a small horse can easily draw, at his usual speed in walking, a boat laden with 50 tons; while the same animal power, with like speed, is

found to draw on that railroad, about 3½ tons; except, indeed, at its inclined planes, where, to produce even this effect, this power must be trebled.

The traveller from the west, after crossing the Alleghany, will enter a packet boat, at Cumberland, propelled, as those on the Ardrossan canal of Scotland, at the rate of nine or ten miles an hour, and reach Washington in a single day of comparative rest.

But little doubt, therefore, can be entertained, that the extension of the navigation of the Potomac, in the mode proposed, would impart new vigor to the agriculture and commerce of the country, and markets of the main river and of its numerous tributaries; and, for this object, your memorialists now appeal to your honorable body, for such further aid to their enterprise, as your wisdom and liberality may be pleased to grant.

In support of this appeal, they beg leave to advert to the character and end of the great work committed to their care.

The Chesapeake and Ohio canal has, so far, been planned and executed with no sordid view to immediate profit to the stockholders, at an irretrievable sacrifice of the leading purpose of Congress, and of the several States who are parties to its charter. That its future profit will be enhanced, by those enlarged dimensions, and that solid structure of all its works, which so far distinguish it from all other canals in America, of its extent, there can be no doubt.

But, this superiority has been purchased at a cost, which, though not incommensurate with its beneficial end, renders the present appeal of your memorialists the more urgent.

If due allowance be made for the increased breadth and depth of the canal, its cost will not be found to exceed the estimates which preceded and laid the foundation of the former subscription of Congress.

The central committee of the Chesapeake and Ohio Canal Convention, whose memorial led to that subscription, computed the cost of the 186 miles of canal, between Cumberland and the entrance of Georgetown, at from four and a half, to five millions of dollars. A foot has since been added to its depth, and its enlarged breadth of 60 feet, at the water line, has been preserved, throughout a much greater portion of its whole extent, than had been originally contemplated. It has, also, been somewhat enhanced in cost, by the compromise rendered essential to its prosecution, by the voices of those rival interests which supplied the greater part of its subscribed capital, and which fixed its eastern termination at the mouth of the Tyber.

Permanent structures of cut stone, laid in hydraulic cement, have superseded, in its whole extent, aqueducts of wood; and bridges across the canal, calculated to impede its navigation and incommode the traveller, have had their places supplied by commodious tunnels, or viaducts, under it, sufficiently enlarged for every species of intercourse.

A preparation has also been begun and prosecuted, for the employment of steam, as its propelling power, by the pavement of the inner slopes of its embankments, at a cost not included in any prior estimate.

It is, therefore, believed that, by the subscription by Congress, of another million to the present capital of the company, the progress of this great national work will be so far advanced, as to assure the completion of its eastern section; and, should Congress please to direct a sale of their subscribed stock, it may then be disposed of without loss. Whether it may prove expedient to dispose of it, at any future period, and to apply its proceeds to the western section of the canal, or to any other work of similar im-

portance, their wisdom may then determine, without any sacrifice of interest. If it shall be deemed expedient to appropriate the present stock of the United States, along with that which Congress is now invited to subscribe, for the completion of the eastern section, to *popular education* within the District of Columbia, so beneficent a direction of this capital would find illustrious examples in more than half the States of this Union, over which their Legislatures exercise, no higher jurisdiction, than the constitution confers upon Congress within the District. Its territory, it is confidently believed, though narrow in extent, is destined, at a period not very remote, and which the proposed canal will accelerate, to contain a population not exceeded by that of several of those States.

The two millions of stock which the United States will hold in the capital of the canal, while it would prove adequate to this object, would not exceed that proportion of the cost of the canal which the exclusive sovereign of all the markets of the Potomac, and of the territory and people of the ten miles square interested in its completion, might rationally be expected to contribute, to an enterprise, in the success of which, the prosperity of the entire District and people of Columbia are eminently involved.

There is not, it is believed, a single State of this Union, however narrow its dimensions, which would not consider the commerce of a river, which, with its various tributaries, either navigable or capable of being so rendered, traverses a territory more than seven hundred miles in extent, cheaply purchased, at so moderate a price.

But motives, more elevated and enlarged, cannot fail to mingle in the contemplation of a work, which purposes to connect, by means of the waters of the Ohio and Potomac, the Chesapeake and the Gulf of Mexico, the Atlantic and the Western States, through the seat of their common Government.

Your memorialists forbear to urge upon your patriotism, because such an effort is as unnecessary, as it would be presumptuous in them, the motive, for granting the aid which they seek, set forth in the preamble of their charter of incorporation. To give to this motive utterance, however, can never be ungrateful to an American ear. It was the preservation of that Union, which has never, at any period since its existence, made louder or more urgent calls for support, on those, who justly appreciate its blessings.

Torn by rival interests which threaten its immediate dissolution, is it not the part of wisdom to allay their irritation, and, where practicable, to moderate their force? And can any agency be so judiciously employed for this laudable purpose, as the intimate union of those very interests, in an exchange of reciprocal benefits?

The United States, as the exclusive sovereign of the District, in which the markets of the Potomac are concentrated, and the Chesapeake and Ohio canal was, by the express terms of its charter, required to terminate, and as the actual proprietor of several thousand lots in one of the District cities, subscribed a million of dollars to its capital stock.

The State of Maryland, whose territory comprehends three counties on the Potomac, upon tide water, and four above it, subscribed half a million; the district cities a million and a half; and their private citizens half a million more. The citizens of Virginia, Maryland, and Pennsylvania, whose dwellings are in the vicinity of the Potomac, subscribed the residue of the present stock of the Company, in all $3,609,200.

Those stockholders have now, in person or by proxy, united in inviting such a subscription from the parties to the charter as may, by promptly extending the canal, according to its original plan, effectually accomplish its avowed purpose.

Your memorialists do not presume to set limits to the aid which a great, wise, and liberal Government shall afford to an enterprise of vital consequence to a very large portion of its citizens, and essential to its own duration.

They might be deemed remiss in the performance of their duty to their constituents, if, before they closed this appeal to your patriotism, justice and liberality, they failed to notice the efforts which are made, to detract from the character and utility of the work which they have, so far, successfully conducted; and as it is believed, as yet, without even the imputed default of a single individual, of the very many, entrusted with the disbursement of the large sums which it has cost.

The plan of the work has already been detailed. It is founded on a careful application of the well ascertained principles of experimental philosophy, to a canal of great length and considerable lockage; which requires enlarged dimensions, in order to sustain its commerce against rival channels of intercourse. To those enlarged dimensions, exclusively, may be ascribed the superior efficacy of its moving power, which assigns to a single horse of ordinary strength the transportation of fifty tons, and to two horses and three persons that of one hundred tons, at the rate of from two and a half to three miles an hour.

For the manner of its execution, the breadth and solidity of its embankments, and the excellence of all its masonry, your memorialists refer to the accompanying report of two engineers of high rank, in the service of the United States, who were charged with its careful inspection, and were prompted, by no motive of interest, to slight or abuse their trust. (C.)

If a large part of the expense of this great work has been incurred within the District of Columbia, it was so ordered by the voice of the stockholders; and, among them, of the proxies of Maryland and of the United States, in pursuance of *the positive requisition of the act of Congress*, authorizing the subscription of one million to the common stock; and that requisition, prompted by the desire of affording an ample supply of water, at a suitable level, to the Maryland canal, by which it was then proposed to connect the waters of the Potomac with the harbor of Baltimore.

Something also was held to be due to the cities and people of the District of Columbia, by whom near two millions of dollars had been subscribed, or four-sevenths of the capital of the common enterprise; in the confident expectation that it would descend to a point where the canal boat could be brought in contact with the sea vessel, without the inconvenience and cost of an intermediate transhipment of the cargo of the former, or a change of its propelling power, for several miles, above the end of its voyage.

And here the undersigned would terminate their memorial, did not another view of the entire subject, in behalf of which they have approached you, call for some consideration. They allude to the persevering efforts, in contradiction of all the recent experience both of Europe and America, to exalt railroads above canals, as superior channels of trade and intercourse as well for heavy as for lighter burdens.

The undersigned aver that, after the most diligent investigation, conduct-

ed under a full sense of the responsibility in which it involved them, as well as their constituents, they have discovered no reason to doubt the expediency of their first decision, as to the best mode of improving the channel of commerce afforded by the valley of the Potomac.

In a memorial presented by the undersigned to the Congress of the United States, at their last session, they felt themselves constrained, by peculiar and very urgent obligations, to give to the public the result of a laborious inquiry into the comparative value of railroads and canals. They beg leave to accompany their present, with a copy of that memorial, and to add, that they have seen no refutation of any of the positions which they have there maintained, on the contrary, all their more recent intelligence serves but to corroborate the conclusions which prior experience had established. (D.) If they have erred, that error is now shared by a very great proportion of the British, as well as of the American public. The company recently incorporated by New Jersey, and who paid a heavy premium for their charter, to construct either a canal or a railroad, or both, between the Delaware and the Raritan, have advanced zealously and vigorously with their canal, which requires a feeder more than twenty miles long to supply it with water; and have deferred the construction of their railroad, at least till their canal be completed.

It is believed that no railway of two tracks, constructed north of the Potomac, for the intercommunication of persons and property, (and your memorialists are apprized of the cost of no less than six,) has required less for its construction than thirty thousand dollars a mile. It is now ascertained, from the last annual report of the Baltimore and Ohio Railroad Company, that their road, to the Point of Rocks, sixty-seven miles and a half in length, will cost, if its contingent expenses are included, without any charge whatever for its moving power, very near thirty-four thousand dollars a mile: while to finish it, on its imperfect plan, with the superstructure of its principal viaduct, that over the river Monocacy, of wood, will, in all probability, extend its cost beyond thirty-five thousand dollars a mile.

In a recent estimate annexed to the same report, for a railroad of two tracks, twenty-nine miles in length, between the Baltimore railway and the eastern boundary of the District of Columbia, their principal engineer sets down its cost at fifty-five thousand dollars a mile; without any charge whatever for its moving power. An estimate lately published in England, for a railway of two tracks between London and Birmingham, exceeds ninety-eight thousand dollars a mile. And the more recent report of the canal commissioners, to the State of Pennsylvania, gives for the average cost of the two railroads, in length 118 miles, which she is now constructing, more than thirty-six thousand four hundred dollars a mile; while that of six distinct canals, in length 134 miles, exceeds but little seventeen thousand dollars: the former being to the latter in the ratio of 2.11 to 1. Yet the first error of the advocates of the superiority of railroads to canals, consisted in estimating the cost of the latter at three, and some of them at four times that of the former. Assuming, however, to be true, what experience by no means justifies, that canals cost as much as railroads, their tolls designed to sustain their fixed capital, and to pay a reasonable profit on its outlay, might be the same in amount, provided the cost of their repairs was also equal. Here, it is to be remarked, without any design to pursue the comparison further, than by a reference to the accompanying memorial, that canals have a decided advantage over railroads; though it is one which sufficient time

has not been as yet allowed, on any railroad constructed for the carriage of persons as well as commodities, fully to appreciate. It is too obvious to require comment, that, while canals acquire solidity from time and use, every part of a railroad is perishable, except its graduation.

Supposing, however, the original cost of both species of internal communication to be the same, and that they require like sums for their annual repair; there yet remains a third inquiry to be answered, before their relative economy can be definitively settled: and this respects the relative cost of their moving power, or their relative expenses of transportation. Here, also, experience is greatly needed, because the cost of this power must depend, as to the road, on the state of its repairs, and cannot fail to be much less on a perfectly new, than upon an old and much worn railroad; while the older a canal becomes, if well constructed at first, the less expense will it require for repairs of any sort, except, indeed, for the doors of its lock-houses, and the gates of its locks.

In addition to the authorities on this branch of inquiry cited in the accompanying memorial, the last semi-annual report of the Liverpool and Manchester Railroad Company has supplied one, which corroborates the conclusion of the memorial, that the cost of transportation, or of the moving power, on the best constructed railroad, is very near, if not quite, six times as great as on an ordinary canal.

The total disbursements, per ton of merchandise, for the carriage, on that road, of 57,881 tons, during the six months ending the 30th of June last, amounted to eight shillings sterling per ton, or to 192 cents for thirty miles of road; being at the rate of $6\frac{4}{10}$ cents per ton per mile. Deducting $4\frac{3}{4}d.$ sterling, or $9\frac{1}{2}$ cents, "for rates and taxes, and interest on loans," as the report requires, and there remains a charge for transportation, exclusive of tolls, exceeding six cents a ton per mile, which is more than six times the usual freight on the canals of New York, Pennsylvania, and Ohio.

Another recent confirmation of this position of the undersigned is derivable from the well ascertained and *continued prices of railroad and canal stocks in Great Britain.* The document which supplies this information is of a very peculiar authenticity, being the British trade list, published weekly at the custom-house in London, under the authority of a public officer bound to the verity of his printed statements by the duties of his public station, and without, in this case, an apparent reason for the slightest deviation from truth; which, if committed, could be most easily detected and exposed, and would, doubtless, be punished by his removal.

It appears, from a series of those weekly lists, descending through the past year, down to the 4th day of September last, that the price of the Liverpool and Manchester railroad stock, which was at £210 sterling the share in 1831, had fallen, and had continued, for a series of those reports, depressed to £180 the share, while the dividend of the company had sunk one per cent. in the same time.

This effect has been ascribed to the approaching use of steam carriages on the common roads between Liverpool and Manchester, and this may have in part operated, as it threatens the most productive, perhaps the only productive custom of this road. The prevalence of the cholera, during a part of the last summer, has also been alleged as one of the causes of the sudden depreciation of this stock; which, although nominally £100 a share, has actually cost a great deal more, through the loss of interest to its subscribers.

The declension of the public curiosity, which early prompted so many persons from every part of the British dominions to visit this road, has also been considered as a reason why it has been less used by travellers in the last half year, and has, therefore, lost a part of its revenue; and this is apparent from the relative number of passengers reported in the last, compared with the preceding semi-annual report.

But that no one of these causes, nor all of them combined, can be regarded as the most efficient agent in occasioning the declension of the market price of this stock, is conclusively proved by one other *very remarkable fact*, that, in the same period in which *this stock* has *fallen in price*, *that of the Mersey and Irwell Navigation Company*, whose line of communication between Liverpool and Manchester exceeds, by fourteen miles in length, the railroad, has risen, in the same market, from £525, the share of £100, to £720, or reached the extraordinary advance, in less than a twelvemonth, of 195 per cent.

When it is reflected that this company have another rival in the very productive canal of the Marquis of Stafford, late the Duke of Bridgewater's, it cannot longer be doubted that the fears entertained of the canals of Great Britain being supplanted by her railroads, have been dissipated by time, the only infallible test of truth, in every branch of experimental philosophy.

The same test has sunk the price of the stock of the new railroad between Albany and Schenectady, the rival communication between those towns of a water line of transportation of three times its length, by the State canal, eighty per cent., the price which that stock had, at one time, risen above par in the market of New York.

The undersigned do not deny the utility of railroads, and would, with regret, be considered as enemies of any species of internal improvement. Though desirous of the speedy union of the eastern and western waters by means of the great enterprise, planned by your predecessors, and committed to their care, they have a much deeper interest in the union and prosperity of their common country.

They, accordingly, without waiting an appeal to their constituents, most readily acceded, on a recent occasion, to the request of the Baltimore and Ohio Rail road Company, for liberty to cross the Potomac, and the Chesapeake and Ohio canal, at a point where the effort of that company had so long and injuriously arrested the progress of their labor.

If they did not concede *all* that they were requested to grant, it was because their duty required them to preserve the canal from the danger of being projected into the rapid current of the Potomac, by giving place to a railroad along its berm bank beneath stupendous cliffs; of having its future repairs impeded, if not totally obstructed; and its connexion with the adjacent country practically excluded by the occupation, by another company, of the only bank of the canal by which its navigation could be approached, without obstructing its tow path.

It was after this grossly misrepresented decision, that it came, by accident, to the knowledge of the undersigned, that the Legislature of Maryland desired the proposals of that company to be submitted to the stockholders of the Chesapeake and Ohio Canal Company.

A general meeting of the company was accordingly convened by the undersigned on the shortest possible notice, and the resolution of the General Assembly was communicated to them in the only form in which it had come to their knowledge.

Among the accompanying exhibits, are the several reports and resolutions of the general meeting, which, from an earnest desire to reconcile their sense of duty towards the great work in the construction of which they are engaged, with their earnest desire to comply with the wishes of Maryland, adjourned from time to time for several months in succession. (E.)

The stockholders having, themselves, expressed in those reports and resolutions their own views of the proposals of the Railroad Company, it does not become the undersigned to interpret them.

The decision of the general meeting terminated in the adoption, by a large majority of the stockholders, of a resolution moved by the proxy of the United States, the most disinterested party to the common enterprise of the various corporations and governments who gave it being.

Justice, however, prompts, if it does not require, the undersigned to add that the last proposition of the Baltimore and Ohio Railroad Company, made subsequently to the final adjournment of the General Assembly of Maryland, had it been acceded to, would have involved a breach of faith to the several persons who had, prior to any interposition of the General Assembly in favor of the proposed compromise, and to any knowledge on the part of the undersigned that such interposition was proposed or intended, undertaken, by solemn contract, the actual construction of the canal between the Point of Rocks and the head of Harper's Ferry falls, on its original plan, and upon terms highly beneficial to your memorialists; but wholly inconsistent with the last proposition of the Railroad Company. This proposition, as finally modified, *expressly involved* the addition of another year to the long period, during which a large part of their expended capital had been rendered unproductive by the injunction of the Chancellor of Maryland; and the modification neither promised nor suggested any indemnity for the past, or equivalent security against future delay.

In the mean time, the Railroad Company was to continue to reap every possible advantage, from having arrived at the point of competition with your memorialists, for the entire commerce of the Potomac; while the empty canal, below this point, was to serve only as an idle monument, to denote the gross inequality of that competition. The works of this company, under actual contract, were to pass beyond the control of your memorialists, who had made those contracts, into the hands of another company, with liberty to delay their completion for twelve months longer than the period prescribed in those contracts, and *as much longer* as events might render unavoidable, or the interest of the constructors prompt.

The undersigned having been generously assured, by a distinguished member of the last General Assembly of Maryland, that no serious injury to the canal was contemplated by the resolution which he had himself originated, as they understood, did believe, as they yet do, that in refusing to accede to such proposals, they were advancing, not only the interests of the company confided to their care, but the higher interests of all the parties who had united in their charter of incorporation. In this belief, they are confirmed by their intimate knowledge of both shores of the Potomac, and the opinion expressed by the Baltimore and Ohio Railroad Company to a former Legislature of Maryland, when they announced their reason *for preferring to cross the Potomac at the Point of Rocks*, to constructing a road to Harper's Ferry, and there crossing the river, in the event that the then depending controversy of the two companies should be settled, as it has subsequently been. (E.)

The undersigned cannot suppose, though an effort to that effect has been diligently prosecuted, that any reproach can attach to the proceedings of themselves, or of the Chesapeake and Ohio Canal Company, for adopting the repeated advice of all the scientific engineers who planned, or have since conducted their canal along its present route, and in yielding to the reiterated expression of their convictions, that the course proposed by the Baltimore and Ohio Railroad Company, though not so designed, it is presumed, would inevitably lead to the serious injury, if not the total defeat of their whole enterprise.

The undersigned feel that an apology is due to your honorable body for the very extended length of their memorial.

They would fain hope that it may be found in the very great importance of the subject to which the memorial relates. It involves, in truth, the continuation of a great enterprise so far prosperously conducted, and which, in its very conception, a former Congress of the United States concurred with the Legislatures of Virginia and Pennsylvania, in pronouncing it to be a work "which may ultimately tend to establish a connected navigation between the eastern and western States, so as to extend and multiply the means and facilities of internal commerce and personal intercourse between the two great sections of the United States, and to interweave more closely all the mutual interests and affections that are calculated to consolidate and perpetuate the vital principles of the Union."

In behalf of the Chesapeake and Ohio Canal Company, and by order of the President and Directors thereof.

CHARLES F. MERCER,
President of the Chesapeake and Ohio Canal Company.

Canal Office, January 12, 1833.

A.

Two reports of the President to the Directors of the Chesapeake and Ohio Canal Company, on the present state of the Finances of the Company, and an extension of the navigation of the Potomac to a point nine miles above the town of Cumberland, on a plan consistent with the present charter.

The President of the Chesapeake and Ohio Canal Company has been enabled, by the recent execution of the order of the board, of the 3d November, to lay before them the following statement of the financial condition of the company, and of the state of the various works now in a course of execution:

On the 1st of December, 1832, the Treasurer's report for the preceding month, exhibited a balance of cash on hand, amounting to	$118,942 80
And, deducting from the total amount of the subscribed stock of the company $ 3,609,200, payable in money, the sum already received, there then remained to be collected	1,233,393 25
Making an aggregate of cash and unexpended stock, to the amount of	1,352,336 05

Which, added to the nett proceeds of the current tolls of the year, say - - - - - - -	31,500 00
Makes the total amount of the available resources of the company - - - - - - -	$1,383,836 05

This amount is applicable to the payment of all such sums as may become due in the prosecution of the various works nearly completed, or recently placed under contract, comprised in the first 102 miles of canal.

Of this line, 22 miles of the most difficult part to construct of the entire eastern section of the canal have been in use for more than two years: 26 miles have been, for as long a period, nearly completed, and awaiting a supply of water from a feeder to be constructed above the legal impediments thrown in the way of the company by the Baltimore and Ohio Railroad Company, and 54 miles have been let out for construction since the removal of those impediments.

Those 54 miles comprehend the extension of the canal within the city of Washington, from the basin of Rock creek to that of the Tiber. The 14 miles let on the 23d of March last, which extend from the Point of Rocks to the head of Harper's Ferry falls: 22½ miles let on the 2d of June, and 15 miles on the 23d of August.

Of these works, making together 102 miles of canal, and a pond of seven miles of still water, those below the head of Harper's Ferry falls, comprehending 64½ miles, were, by contract, to have been finished on the 1st of the present month. It is now confidently believed that they will be opened for navigation by May next. The remaining 37½ miles are, by contract, to be completed on the 1st day of September next.

On the various works yet to be completed, there had been employed in the week preceding, according to the return of labor of the 1st of December, 3,772 mechanics and laborers; 827 horses, mules, and oxen, and 6,511 pounds of gunpowder; and this force was then daily increasing. (On the 8th of December, the first of these numbers exceeded 4,130.)

Those works are distributed into two residences, conducted under the immediate superintendence of the President and Directors of the company, two resident and seven assistant engineers, aided by several rodmen and laborers. They comprehend two dams of twenty feet elevation, across the Potomac, a stone aqueduct of seven arches across the Monocacy, three stone aqueducts, each of three arches, across the Catoctin, the Antietam, and Conococheague; 63 culverts, of which several afford road-ways under the canal; one tide and seventeen lift-locks, three of which are lateral to the main line of canal, and designed to communicate with the river; and three guard-locks which subserve the same purpose at the entrances of the several feeders.

The estimated cost of these various works, which are believed to be in the hands of efficient contractors, some of which have been, and many of which are, nearly completed, all of which have been begun or definitively marked out for immediate construction, including every necessary allowance for lands, fencing, bridges, or ferries, waste weirs, and lock-keepers' houses; and for arrearages withheld on estimates made pursuant to prior contracts for other portions of the canal, after deducting certain works which may be *judiciously deferred*, and all expenditures *hitherto incurred* on the 54 miles herein described, amounts to $1,287,644 22, and is applicable to the following parts of the line of canal in the subjoined proportions, viz.

To the works now in progress in the city of Washington, between the basin of Rock creek and that of the Tiber - - -	$21,478 47
To the payment of the sum of 20 per cent. retained out of the estimated value of part of the works in the same space already done, amounting in the whole, to -	4,500 00
To the work remaining to be completed between the Seneca feeder and the Point of Rocks, after deducting the November estimates, payable the 10th and 11th of the present month, and $7,000 for a portion of this work, which may be deferred with advantage till the navigation is opened - - - - - -	34,026 00
To the payment of sundry sums of retained money, which will become due on the completion of the part of the canal last mentioned, after sundry recent advances to the contractors - - - - - -	9,500 00
To the satisfaction of unsettled claims for lands in the country, and town lots, required for this portion of the canal, after deducting $7,371, paid on that account since the last annual report, - - - - -	20,000 00
Making the total sum required to complete the various works, and satisfy outstanding and unliquidated claims, arising from the construction of the part of the canal between the Point of Rocks and its eastern termination, a distance of 50½ miles, - - - - -	89,504 47
To the payment of future estimates, after satisfying those for November last, of the work remaining to be done to complete the canal between the Point of Rocks and the head of Harper's Ferry falls, a distance of 14 miles, after deducting $11,200 for a portion of the work that should be deferred till the navigation is opened, - -	233,744 00
To the payment of the sums retained out of the past estimates, for this portion of the canal, which will become due on its completion in May, 1833, - - -	12,000 00
To satisfy the awards of jurors on land condemnations, and the expense of compromises effected of land claims on this part of the line of canal, after deducting $7,250 paid on these accounts, the total estimated expense being $1,000 a mile, - - - - -	6,750 00
So that the sum required to open the canal between the Point of Rocks and the head of Harper's Ferry falls, after deducting the November estimates, amounts to -	$252,494 00
The preceding resources are further applicable to the payment of the estimates, to be hereafter returned, for the 10 miles of canal between the head of Harper's Ferry falls and Shepherdstown; which, after excluding the estimates for November last, and after deducting $3,150 for works that may be prudently deferred till the navigation shall have been opened, amount to - -	151,432 00
To the payment of the retained money, on all estimates for this part of the canal made prior to the 5th of December, being 20 per cent. on $27,069, - - -	5,413 00

These two sums make the whole amount, exclusive of land condemnations or purchases, (which will be computed below,) and of the sum deferred as above stated, required for the portion of the canal between the head of Harper's Ferry falls and Blackford's ferry, opposite to Shepherdstown, in Virginia, - - - - - - $156,845 00

It is at this point that the 3d residency ends, and the 4th commences. Next, the above resources are applicable to the payment for the works of the 4th residency, which, embracing 7 miles of still water next above the 4th dam and feeder from the Potomac, extends to the 5th dam, which is situated eight miles above the town of Williamsport, in Maryland, and 2½ miles south of Clear Spring, on the artificial road from Baltimore, by Hagerstown and Hancock, to Cumberland, in the same State.

The 27½ miles of canal making this residency are divided by the seven miles of still water into two parts; one of them, 12½ miles in length, extends below dam No. 4, and the other, 15 miles long, below dam No. 5. Their probable cost has been twice carefully estimated since the actual commencement of their various works, and the last reported estimate, dated the 1st of December, after deducting the November estimates, makes their cost, exclusive of the sum of $9,200, the expenditure of which should be deferred till the navigation of this part of the line is opened, amount to - - - 726,866 87

Adding to this sum the 20 per cent. retained of the estimates, amounting to $50,112 48 hitherto made, and paid according to contract, being - - - - - 10,022 50

And, adding for lands, bridges, and ferries, on the 37½ miles of canal between the head of Harper's Ferry falls and the upper dam, $1,000 a mile, reduced by a deduction of $5,578 62 already paid on those items of charge, being - - - - - - 31,921 38

And the aggregate cost of the canal comprehended in the 4th residency, including the land purchases and condemnations for the 10 miles of canal at the upper end of the 3d residency, will be - - - - - 768,800 75

The aggregate cost of the entire 37½ miles above the head of Harper's Ferry falls will be - - - - $925,645 75

And of the 64½ below that point, will be - - 341,998 47

The cost yet to be incurred, of completing, for navigation, the entire line of 102 miles, and the seven miles of still water between the two upper dams, and eight miles of still water above dam No. 5, will be - - - $1,267,644 22

Add, for the salaries of officers and engineers, stationery, repairs of instruments, advertisements, printing, and postages, for a period of nine months, - - - 20,000 00

And the total amount of the objects of expenditure to be provided for by the 10th of October next, after applying to the satisfaction of the last November estimates the sum $58,523 64, will be, according to the most exact calculation, - - - - - - -		$1,287,644 22
Deducting from the resources of the company, included in the treasurer's report of the 1st of December, the amount of the November estimates, and adding $31,500, the computed nett revenue from tolls prior to the 10th of October, 1833, the sum applicable to the preceding expenditure will be found to consist—		
Of cash, - - - -	$60,419 16	
Of uncollected stock, - -	1,233,393 25	
Of tolls to be received prior to the 10th of October, 1833, -	31,500 00	
In the aggregate, making - - - - -		$1,325,312 41
And leaving, applicable to other objects of expense,		$38,168 19

But it is believed that this sum will not much more than suffice to cover the reduction of the available stock of the company, occasioned by deaths, removals, and insolvencies, since the original subscription in October, 1827. This sum made part of that which was computed in the last annual report, under the head of bad and doubtful debts, at $70,000, a moiety of which may prove to be of the former description.

The deferred expenditures computed in the aggregate at $30,550, being an amount to be hereafter laid out for permanent lock houses, pivot bridges, &c., when added to the sum of $1,287,644 22, will make the total amount required to perfect the 102 miles of canal and 15 miles of still water navigation, $1,318,194 22; which, added to the amount hitherto expended by the company, will make the entire cost of so much of the eastern section of the canal, very near $3,650,000.

From this amount should be deducted $20,000, for the value of the disposable lands acquired by the company in their various compromises with the owners of the ground over which the canal passes, and $100,000, the estimated value of the mole across the mouth of Rock creek, leaving $3,530,000 for the entire cost of the 117 miles of canal and improved river navigation, being near $30,600; and, if the canal alone be computed, about $34,000 a mile.

A part of this sum has been, in fact, expended on the survey and the acquisition of lands for the western section of the canal. A considerable sum in legal controversies, forced upon the company, and especially that with the Baltimore and Ohio Railroad Company; and on other incidental expenses, including the repairs for two years of the twenty miles in public use, not properly chargeable to the construction of the canal. The whole of these items would not fall short of $60,000; and, after crediting the sum expended in compromising the local disputes touching the eastern termination of the canal with the $100,000, which the sale of the mole between Georgetown and Washington may produce, a considerable sum will remain to be deducted from the entire cost of the first 102 miles of canal, prior to any correct average per mile of the whole cost incurred upon the part of the eastern section about to be completed. In any estimate, however, it is be-

lieved that, while the canal itself yields in its enlarged dimensions, and the durable construction of all its parts to no canal in America, its cost will fall short of that of any permanent railroad of two tracks in the world.

The value of the water power acquired in the construction of the canal, is computed, in the *revenue* of the company, to be derived from the sale of it, and is left, for the current year, to meet contingent expenses incurred in the repairs of the canal, and in the collection of tolls. The nett income from the latter is computed, as has been shown, at the gross amount received in the last year, on the reasonable presumption, that all the expenses which might otherwise be properly charged upon it, will be defrayed out of the additional tolls arising, after the 1st of May next, from the 42½ miles of new canal, which will then be, for the first time, opened for public use.

C. F. MERCER,

President of the Ches. & Ohio Canal Comp'y.

December 15, 1832.

B.

A brief exposition of the cheapest efficient plan of bringing into use the entire navigation of the Potomac valley, as high up as a point, nine miles above Cumberland, in a manner compatible with the preservation of the Charter of the Chesapeake and Ohio Canal Company.

The charter requires 100 miles of canal to be in operation within five years from the period of its commencement, which was the 5th of October, 1828. Accordingly, at the earliest practicable period, 102 miles of canal have been placed under contract, 64½ of which will be completed by the 1st of May, 1833, and 37½ by the 1st of September, 1833, one month prior to the expiration of the period of five years from the commencement of the canal, without any allowance for the legal obstructions which arrested its progress for three years and a half, above the Point of Rocks.

The completion of the 102 miles of canal will consume the present available stock of the company, and probably the surplus tolls received prior to the 1st of October, 1833, after paying the expenses of repairs, of collection, and of lock-keepers.

The entire cost of the 102 miles of canal will be, therefore, about 3,650,000, of which near 450,000 will have been expended below the head of tide water, on or about four and a half miles of canal, and the basin at Rock creek between Georgetown and Washington.

The construction of the above works, including the dam eight miles above Williamsport, denominated No. 5, in the estimates, will give 102 miles of canal navigation, and 15 miles of still water, viz. 8 miles above dam No. 5, and 7 miles above dam No. 4.

Let the next dam, numbered 6, be placed at the best situation for the next feeder, which is believed to be immediately below the mouth of the Great Cacapon, and 26½ miles above dam No. 5; and let a canal be extended thence down to the commencement of six feet depth of water, in the pond immediately above dam No 5. This will add 17½ miles to the length of the canal navigation, and 9 miles to the improved still water navigation; that being the distance for which dam No. 6 will create back water up the river.

Let the next dam, No. 7, be erected in like manner, immediately below the mouth of the South Branch of Potomac, and a canal, 25 miles in length, be conducted from thence to the highest point on the pond of still water behind dam No. 6, whence a navigation for the canal boats, or 6 feet depth of water, can be had down to the dam. The dam, at the mouth of the South Branch, will cause a still water navigation to extend as far up the Potomac as above Alum Hill, a distance of three miles.

Let another dam, No. 8, the third and last that will be required, be erected at the ledge of rocks, described by the United States' engineers in their report to the Department of War, of October, 1826, as situated one mile above Cumberland; and let a canal be constructed thence, at an elevation of 31 feet, in passing through Cumberland, a distance of 15½ miles, as proposed by the United States' engineers, to the head of the pond above dam No. 7. Dam No. 8 will produce, as those engineers have stated, still water navigation for the distance of 8 miles of the river above its position.

Thus, by the addition of three dams and three canals, communicating with the main river, at both extremes of each, there will be extended up the Potomac, as far as 9 miles above Cumberland, being, in all, a distance of 195 miles from the mouth of Tiber creek, in Washington, a permanent navigation, affording sufficient depth of water, at all seasons of the year, for boats of 100 tons burden.

The entire line of improved navigation will consist of 160 miles of canal, and 35 miles of still water. It will approach within nineteen miles of the mouth of George's creek, or Western port, at the base of the Alleghany, where are to be found, in Savage mountain, the richest coal banks of the valley of the Potomac.

The cost of the last 37½ of the first 102 miles of canal, will be found to average, including every contingent expense, about $27,000 a mile.

Very intelligent and experienced contractors have expressed the opinion, that the part of the canal above Williamsport may be constructed at a cost, ten per cent. less than that of the 37½ miles; 8½ of which they are now making. The 58 miles of canal required, as above stated, to complete, on the plan before mentioned, the entire navigation herein described, would, therefore, cost about $25,000 a mile, or, in all, one million four hundred and fifty thousand dollars.

A careful examination of the estimates of the United States' engineers, for the canal which they proposed to construct along the same ground with the above canals, warrant the conclusion that the above estimates may be relied upon: for, assuming the quantities of the United States' engineers to be correct, and deducting from their prices the overcharges, now known from experience to be such, their estimates, for the same lines of canal, fall below the sums here allowed. As the proposed canals will be two feet wider at the surface, and a foot deeper, than their plan required, the higher amount is retained as the just measure of their cost.

Should this sum be obtained during the present winter, this plan of navigation can be readily completed by the 1st of May, 1835, probably by the 1st of December, 1834, or in two years from this date. Its purpose is evidently divisible into three parts. The first 17½ miles will unite the main canal with the mouth of the Cacapon, and, connecting it with the artificial road to the west, at Hancock, will reach the lumber region of Pennsylvania and Virginia, lying north and south of Hancock, and along the

banks of the Cacapon. The second addition of 25 miles to the canal, will open the access to it from the South Branch. The third and last, consisting of 15½ miles, will carry the navigation up to Cumberland, and nine miles above it, including the mouth of Patterson's creek, in Virginia. Each part is a distinct work.

To render the entire line of navigation perfect, it will be necessary to fill up the intervals of still water, from time to time, hereafter, by canals; and there will remain, after the completion of the preliminary work here proposed, of the period allowed for the completion of the eastern section of the Chesapeake and Ohio canal, by the charter of the company, five years for the construction of those short canals, exclusive of the time consumed by the intervention of the court of chancery of Maryland, at the instance of the Baltimore and Ohio Railroad Company, which may be computed at three years and a half more.

The outlet locks from the main stem of the continued canal, after it shall have been finished, will afford access to it, for the river boats, from each sheet of still water at its upper extreme; while each of the several guard locks, above their respective dams, will afford a similar access at its lower extreme; so as to accommodate the trade of the Virginia shore, and of the southern tributaries of the Potomac, as the Shenandoah, Opecon, Cacapon, South Branch, and Patterson's creek. No part, therefore, of the works constructed on the first and less perfect plan of navigation, will be lost, after the continuous canal, from the mouth of Tiber creek, in the city of Washington, to one mile above Cumberland, shall have been completed, according to the terms of the charter of the Chesapeake and Ohio Canal Company, and to the concurrent recommendations of the various civil and military engineers who have designated its proper route, and estimated its probable cost.

The coal banks, situated on the Virginia shore, four miles below the mouth of George's creek, will be but fifteen miles above the sheet of still water produced by the dam near Cumberland; those of Savage Mountain, in Maryland, but nineteen; and the obstructions of the river navigation, in this distance, may speedily be overcome in a similar mode to that here recommended. The coal trade of the Potomac may, therefore, be confidently expected to derive immediate activity from the execution of this plan of navigation. It needs for its accomplishment, as has been shown, but the addition of the further sum of 1,450,000 dollars to the stock of the Chesapeake and Ohio Canal Company.* Its effect will be greatly to enhance the value

* The undersigned has not, for several years, compared the relative amount of tolls on the New York canals, derived from the various subjects which enter into their transportation. But when their revenue had reached near a million of dollars, lumber, and the rude productions of the forest of that State, contributed more than a moiety of their tonnage.

In Great Britain, the most productive canals derive their profits from coals and coke. Next in importance to these is lime, for manure, the price of which depends on the cheapness of fuel. It has been tried on the soil of Montgomery, in Maryland, with great success, and would doubtless contribute to renovate the lowland country, as well of Virginia as of Maryland. The consumption of both coals and lime would be augmented by the distance at which they are found from tide water, since both would ascend the numerous tributaries of the Potomac, by whose mouths the canal is conducted, and would be taken over land to the adjacent towns, along with lumber for building and for enclosures.

It is in the cheaper transportation of such cheap and bulky commodities of universal consumption that the great superiority of large canals over railroads is most conclusively manifested.

The Chesapeake and Ohio Canal Company have been charged six cents a ton per mile for transporting from the Patapsco rough granite for the sheeting of an aqueduc, across

of the entire capital of the company, which will then be, exclusive of the subscribed stock and debts of the Potomac Company, $ 5,024,000, after declaring forfeited for non-payment, 352 shares of the stock now subscribed.

This plan of navigation does no more than recommend the construction, in the first instance, of the necessary feeders to supply the continuous canal, and of the means, by suitable locks, of access from the basins of still water, above those feeders, to the main canal. It proposes, in no place, *a permanent substitution* of still water for canal navigation. It does not contemplate the construction of a single dam which would not be required for the continuous canal: it requires, to give it practical effect, no alteration of the charter of the company. It exposes the existing charter to no hazard of forfeiture. Instead of retarding, it accelerates, by providing new facilities of construction, and an early augmentation of revenue, the final completion of the eastern section of the canal; while it also extends to a point nine miles above Cumberland, the permanent navigation of the river Potomac.

Besides the great end which the completion of the Chesapeake and Ohio canal, of which this constitutes an essential part, was designed to subserve, the close union of the eastern and western States by the shortest practicable line of easy intercourse between them, there are directly and deeply interested in the construction of the eastern section, large portions of the south-western counties of Pennsylvania, of Washington and Alleghany counties of Maryland, and the entire and the extensive northwestern territory, embracing many counties and a large portion of the population of Virginia. How much the prompt use of the eastern section of the canal would confirm the sense of the benefits, both local and national, to be derived from the speedy completion of the entire canal, may readily be conceived, and consequently it needs no farther argument to demonstrate the expediency, in every view, of the plan here recommended.

C. F. MERCER,
President of the Chesapeake and Ohio Canal Company.

December 15, 1832.

Report of T. F. Purcell, Esq. on the works of the Fourth Residency, accompanying a detailed estimate of their cost.

ENGINEER'S OFFICE,
Williamsport, December 4, 1832.

SIR: I have the honor to lay before you, for the information of the Board of Directors, a detailed report of the progress and present state of that part of the Chesapeake and Ohio canal which you have entrusted to my care and supervision: also, accompanying the report, is a statement of the work done by the contractors, in the prosecution of their several contracts, up to the first day of this month; together with an estimate of the probable cost of the work to be done to complete the canal up to a point 8 miles above the town of Williamsport, and 108 miles from the city of Washington.

Cotoctin creek. The cost of transporting the same commodity on the Chesapeake and Ohio canal, where wood pays a toll of one cent a ton per mile, would have been a third only of the above charge, and even this bears too great a proportion to the value of the commodities, and, at great distances from market, should have the tolls charged on it rateably reduced.

The portion of canal which is the subject of this report extends from Blackford's Ferry, at Shepherdstown, to a point on the river near the Big Spring mills, embracing a distance, along the river, of 35 miles. This distance is divided into 55 sections of canal, and 7 miles of river or slack water navigation.

Above the upper terminus of the canal, there will be about 8½ miles of still water navigation, created by the dam which must be erected across the river to supply the canal with water. Thus the whole extent of improved navigation will be 116½ miles, of which 101 miles will be canal, and the remainder, 15½ miles, of slack water.

The last mentioned sheet of still water terminates at a point about 8 miles below Licking creek; and this pool, along its whole length, is never more than 3 miles from the great western turnpike. Clear Spring, a flourishing town on this road, 11 miles west of Hagerstown, is only 2½ miles from the point at which I have located the upper dam, and a good road now exists between these places.

In selecting the position for the upper dam, reference was had to the future operations in locating the canal above this point. To this end two conditions had to be served; first, that the length of the canal fed from the river alone, should not exceed 25 miles, and secondly, that the next feeder dam should be below the mouth of the Great Cacapon, so as to admit immediately into the canal the trade which will descend that river. In planning the work, reference was had to the various streams which traverse the country laterally, and empty into the Potomac; and the levels by which they are passed adapted to the extension of branch canals along their margin. Of this description are the Opequon and Conococheague creeks: the first in Virginia, after passing through a fertile district in Berkley county, discharges into the pool intended to be made by dam No. 4. The second takes its rise in the State of Pennsylvania, and, after passing near to several flourishing towns, and through a rich and fertile country, enters into the Potomac at Williamsport. Both of these streams may be made navigable at an expense trifling when compared to the benefit which the improvement would impart to the adjacent country.

You will perceive, by the accompanying estimate, that the total cost of the work done amounts to $50,112 48, and of that yet to be done to $768,615 87; making a total cost, for 43 miles of canal and slack water navigation, of $818,728 35; which is an average of $19,040 19 per mile.

This estimate is based on measurements made by the locating party, corrected and revised so far as the work has been commenced: these measurements were made with considerable care, and it is believed they will not be found to vary materially from the truth; indeed, in a few cases where the sections are nearly completed, and the work computed from actual admeasurement, the quantities correspond with remarkable exactness. The prices affixed to the quantities are those at which the work has been let; and there is reason to believe, from the vigor with which the several contracts have been prosecuted, that they will be finished without any material augmentation of price to the contractors.

The several sections requiring exterior protection walls are in a rapid state of progression; all the heavy work is diligently pressed forward by the several contractors; the foundations for the culverts most exposed to the refluent water of the river and the locks, are all begun. The dam below Opequon creek is extended one-third of the distance across the river, seve-

ral feet in height; its abutement will soon be above the elevation of the common winter floods, and there is little doubt that, with a continued energy and diligence, the whole work may be put in navigable condition during the fall of 1833.

The work would have been in a much more forward state, but that, in common with other sections of the country, this line was visited by that most awful disease the cholera. It prevailed throughout the whole line with a virulence that defied medical skill; the workmen fled in consternation on its approach; and the sections were nearly deserted for several weeks. It has, however, long since disappeared, and good health prevails along the entire line of canal.

Many sections, you will perceive, have not been commenced: they are all of that description called easy or light, and have been delayed, that the sudden introduction of so much work into actual execution might not operate to produce an injurious competition among the contractors for laborers; which, in the end, would prove ruinous to them, and injurious to the interests of the Canal Company. There will be no difficulty in completing any of these sections between the first of March and September.

Respectfully submitted, by

THO'S F. PURCELL, *Engineer.*

To the PRESIDENT, *of the*
Chesapeake and Ohio Canal Company.

C.

Report of Colonel John J. Abert and Colonel James Kearney, of the United States' Topographical Engineers, upon an examination of the Chesapeake and Ohio Canal from Washington City to the "Point of Rocks;" made by order of the Secretary of War, at the request of the President and Directors of the Chesapeake and Ohio Canal Company.

THE PRESIDENT AND DIRECTORS OF THE CHESAPEAKE AND OHIO CANAL COMPANY.

In meeting, May 6, 1831.

The following preamble and resolution were adopted, to wit:

Whereas the Legislature of Pennsylvania have requested their Senators and Representatives to apply to the Congress of the United States for the subscription of an additional million to the stock of the Chesapeake and Ohio Canal; and the attention of the stockholders, at the approaching general meeting, will, of necessity, be attracted to this subject, with a view to co-operate with the generous purpose of that Commonwealth: Be it

Resolved, That the President of the company be, and he is hereby, authorized to address a letter to the Secretary of War, requesting that the Board of Internal Improvement of the United States may be instructed to examine and report to the department the present condition of the Chesa-

peake and Ohio canal, along with their judgment of the plan adopted therefor, and the execution and cost thereof.

And be it further resolved, That the engineers and other officers of the company be, and they are hereby required to afford every facility within their power to such officers of the United States' Board of Internal Improvement as may be deputed to make the preceding examination and report.

Extract from the Journal of Proceedings.

Attest: JOHN P. INGLE,
Clerk of Ches. and Ohio Canal Co'y.

CANAL OFFICE, *Washington, May* 20, 1831.

A letter was received from Colonel John J. Abert, notifying that an order had been issued, directing the survey, as requested, and to which the following reply was made:

Col. J. J. ABERT:

DEAR SIR: I have just received your letter of the 13th instant. An order will be forthwith forwarded, and delivered to Mr. Thomas F. Purcell and Mr. Daniel Vanslyke to attend you as far as the Great Falls, where the 1st and 2d residencies into which the canal was distributed, below that point, was divided during its construction. At the Great Falls, Mr. Cruger, the engineer of the 3d residency—now part of the 1st—will be ordered to meet you, and to accompany you through the residue of the late 3d and the 4th and 5th residences. Mr. Purcell will proceed with you to the end of the present 1st residency, which extends to the 40th section, or about three miles above Seneca. The books of the various residencies will show the prices of the work executed; but if, in any instance, defective, that defect can be readily supplied in Washington.

Our board had, some time ago, fixed on Saturday, the 21st, (to-morrow) for an examination of the entire line below the "Point of Rocks," with a view to draw to our aid some small streams or the Great Monocacy, so as to fill the part of the canal, now nearly done, below that river; and I presume it would best answer your purpose to be left unembarrassed by our presence, in the discharge of the duty you have to perform. But if, at any time, for any purpose whatever, my assistance, or that of any director of the company, can prove of any use to the prosecution of your labors, I beg you to command mine, and I am confident you will find the like disposition to accommodate you on the part of the directors.

I will instruct our clerk to forward to you a comparative statement of the actual cost of the various subdivisions of the canal, according to our contracts, and of the estimated cost, by Messrs. Bernard, Poussin, and Howard, then constituting the United States' Board of Internal Improvement; in the examination of which, in relation to the plan of the canal contemplated by the latter, and now executed, I ask your attention to the difference of the proposed, and real depth and breadth of the two works.

I am, dear sir,
With sincere respect,
Your obedient servant,
CHARLES F. MERCER,
Pres. Ches. and Ohio Canal Co'y.

REPORT.

I have the honor to lay before you, for the information of yourself and the Board of Directors, the accompanying report from the Engineer Department, made by two officers of the topographical corps, agreeably to the request of the stockholders of the Chesapeake and Ohio Canal Company, to the President of the United States.

Very respectfully,

J. H. EATON.

To Charles Fenton Mercer,
President of the Chesapeake and Ohio Canal Company.

Sir: In obedience to your orders of the 11th of May, we have made the examination of those parts of the Chesapeake and Ohio canal which are "completed and under construction," and have now the honor to report the result of our observations.

The first part of the work which we visited was the basin at Georgetown. This basin is formed by a dam thrown across the mouth of Rock creek, forming an extensive quay or landing place, one of its faces being on Rock creek, and the other on the Potomac river. The length of the quay on the Potomac face is one thousand and eighty feet; two hundred feet of which is occupied by a tumbling dam, for the delivery of the surplus water of this creek, and thirty-eight feet occupied by the tide-lock, leaving eight hundred and forty feet front on the Potomac river. Piles, each one foot in diameter, were driven throughout the whole extent of the river front, touching each other, and then at every three feet of the interior, to a distance of twelve feet, until they refused a pile driver of eleven hundred pounds. The whole of these piles were then connected by heavy timbers, bolted to the head of each pile, and this frame work was then united by a course of hewn timbers fitting close to each other, and five inches thick, and well secured to the frame and piles. On the front of this pile work there is a well laid dry wall, twelve feet thick, and seven feet high, including the coping. Strong and frequent ties of timber firmly connected with the pile work, are extended under the soil of the quay. Until these were affixed, a slight curving had been observed in part of the wall; but, since that time, not the least indication of yielding is perceptible, nor do we think there is any just ground of fear for the durability of this part of the work. It stood, without injury, the unusual freshet of the river of the last spring, on the breaking up of the ice.

The width of the quay is one hundred and sixty feet, except at the city end, where it narrows to eighty feet. Sixty feet in width of the centre of this quay is intended for warehouses and stores, and the rest of the space is to be left open for streets and landing places.

A bridge is constructed over the head of the tumbling dam, connecting the Georgetown part with the city part of the quay. This bridge is of timber, on piles—a simple, but substantial structure.

The inside of the quay forming the Rock creek face, is protected by a well laid dry wall, surmounted by a stout hewn timber coping, bound to its place by tie-timbers extending some distance into the soil. The whole of the space between these two fronts is already filled up with earth.

The walled face of the basin also extends upon both sides of Rock creek, to the second bridge, constituting an entire length of walling on the inside of the basin of five thousand five hundred feet, (about 300 feet of the wall is yet to be laid) and inclosing an area of eight and one-quarter acres.

But the real extent of this basin is much greater, as the water of this creek, when raised by the dam at the quay, will be deep and navigable up nearly to Patterson's paper-mill, and will extend over an area about twice as great as that included between the walls.

About six thousand cubic yards of earth yet remain to be removed from the space between the walled parts of the basin.

The communication between the basin and the river is effected by a tide-lock, resting upon piles. These piles are of one foot diameter, driven at every four feet, with a pile-driver of eleven hundred pounds. After the piles are driven home, and cut to a uniform level, a heavy frame of square timber, bolted to the head of each pile, connects the whole of the piles together. Over this frame three courses of two inch plank are laid, alternately crossing each other, and the whole united by tree-nails to the frame and piles; and upon this prepared foundation the masonry of the lock is built. The inside and outside courses of the lock walls is range work, with hammered faces, of the Aquia creek freestone; the interior, or backing of these walls is rubble work of granite. The range work is laid in hydraulic cement, and the whole of the interior of the wall is carefully grouted with cement at every range. The wall of the lock on the side next to the tumbling dam is twelve feet thick; that of the opposite side is eleven feet.

One end of one of the walls of this lock the end next to the river of the upper wall—moved soon after it was built, and before the mortar had set, drawing the masonry out, but without breaking a stone, leaving an opening at the hollow quoin of about seven eighths of an inch. It has not moved since that period; but, as it has not been used, this defective part has not, as yet, been exposed to the pressure of the water. We do not think it secure in its present condition, and it may probably be found necessary to reconstruct this end of the lock.

The canal communicates with the basin which we have just described, by means of a lock, being lock No. 1, of the canal line.

This is a stone lock, faced with the Aquia creek freestone, and has the appearance of a good piece of masonry. One end, however, of one of the side walls—the end which joins on to the basin—has, from a defect in the foundation, yielded at the hollow quoin, and left an opening of about one inch.

The chamber of this lock is 100 feet long by fifteen feet wide, and it has a lift of eight feet, but it has not yet been in use, and has, consequently, not yet been exposed to the pressure of the water. The masonry appears remarkably well, except at the defective end of which we have just spoken, the durability of which we are disposed to doubt.*

Between this and the next lock, No 2, there is a small pool 100 feet long by 46 feet wide, and inclosed by a stone wall, generally well constructed, but at places there appears to have been too many small stones admitted. At the head of this pool, a stone bridge has been thrown over the canal for the accommodation of Green street. The passage under the arch is as wide as a lock.

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* Since we examined this lock, we have been informed that the defective end has been taken down, and that it is to be re-built from the foundation.

Lock No. 2 is immediately adjacent to this bridge. It is of the same kind of masonry, of the same dimensions, and on the same plan, as No. 1. There is no evidence, whatever, of yielding, in any part of this lock, nor has it as yet been in use.

The pool between this lock and the next above it is also small, being 120 feet long by 46 feet wide. Its sides are secured by dry stone walls. There is a drain from the streets of the town into this pool. It would, of course, have cost more to have conducted this drain along the side of the canal until it could have discharged itself into the basin, but, considering the small size of the pool, and the quantity of deposite which will be washed from the street into this pool, we think it would have been a better course, notwithstanding the increased expense. But, it should be added, that the water may be drawn off in about twenty minutes from the pool, and it may then be cleaned.

At the head of this pool there is another stone bridge similar to the last, for the accommodation of Washington street, and adjacent to this bridge is lock No. 3.

This lock is of the same dimensions, style of masonry, plan, and lift, as the locks previously noticed. There is another small pool between this and the next lock, 120 feet long by 46 feet wide, with its sides protected by a wall of dry masonry. There are stone steps on each side of these pools, conducting to their bottom; and, in relation to the size of the pools, it ought, in justice, to be remarked, that the nature of the ground which they occupy does not admit of their being larger.

At the upper end of this last pool there is another stone bridge similar to the last, for the convenience of Jefferson street, and adjacent to this bridge is lock No. 4.

This is the last of the lift-locks in Georgetown, and is similar, in all respects, to those previously remarked upon. From this lock the canal maintains, throughout the town, a width of 46 feet and a depth of six.

The next street crossed by the canal line is Congress street; for the accommodation of which there is a stone bridge with a span of 40 feet. All these bridges are very neat and substantial structures, faced with the freestone of Aquia creek, well laid, and with hammered faces. The locks are also faced with the same kind of stone, wrought in the same manner. We are disposed to think that neither the texture of this stone nor its specific gravity, is of a kind to have encouraged its use in such structures, particularly in the locks; but, in justice to the practised judgment of the engineer, we feel bound to add, that the locks above, (which have been in use about a year) and which are faced with the same kind of stone, stood the excessive and long continued frosts of the last winter without the least injury.

Proceeding along the line of the canal, the next structure we encountered was the bridge for the accommodation of High street. The span of this is to be 54 feet. The abutments are partly completed, and the centering for the arch is erected, and as much of the work as is done is certainly of a very substantial character. From this bridge to the market-house, on the next street, the work is in active progress. A vast deal of rock was encountered between Congress and Market streets, the greater part of which has been already removed; about 3,000 cubic yards yet remain to be blasted between High and Market streets. As this part of the line passes through a densely settled part of the town, the blasting could not be pursued with as effective

an activity as in other places, from the necessity of using small charges of powder.

The next street beyond High street, is the one in which the market-house is erected. The canal passes under this house, and two substantial wooden bridges are built immediately on each side of it.

There is then a wooden bridge for the accommodation of Duck lane and one for Frederick street.

The whole of the canal which passes through the town, is to be rivetted by a stone wall, the greater part of which is already built, and is a specimen of good work.

The first culvert on the line is the one for Market street run. It has a span of eight feet, and is well built.

At the upper end of Georgetown the embankment of the canal is sustained by a strong dry stone wall on its outside. As the wall had shown some indications of yielding to the pressure of the earth, strong buttresses had been constructed to aid it. The water has not yet been let into this part of the canal, and the stability of the wall has not, therefore, been tested by this additional pressure. The canal, its bottom as well as embankment, for a a great distance in its line on each side of this wall, has been carefully puddled.

The width of the canal up to Frederick street is forty-six feet, and its depth six. From this street it gradually widens to eighty feet, and increases in its depth to seven, which it maintains through the remaining part of this level up to lock No. 5. This increase in depth of one foot in a part of this level, appears to us a hazard to the embankments and culverts, not compensated by any adequate advantages.

College creek, which passes between the town and Mason's foundry is admitted directly into the canal, but as its bed is much lower than the bottom of the canal, no bad effect can result from the deposite it will occasionally bring down.

This bed is thirty feet below that of the canal, and, when the latter is filled, this part of it will be exposed to a pressure of thirty-seven perpendicular feet of water. Considering this fact, and its consequences, it might appear to an observer, as a better course, to have constructed a culvert for the delivery of this creek. It so appeared to us, but on inquiry of the resident engineer, Mr. Purcell, he informed us that the subject had been carefully studied, and the soil examined to a great depth, and found treacherous and unsafe, and that if a culvert had been constructed, its durability was very doubtful, and the cost would have been much greater than the method ultimately adopted of embanking over the pass, and admitting the creek into the canal.

There is a small wooden bridge over this creek for the accommodation of the public road, which occupies that side of the canal banks. It is sustained by two massive abutments of dry masonry, in which the stone appear to be remarkably well laid.

From this bridge up to Mason's foundry, the canal is still sustained on the river side by a high embankment, and its opposite side, on which the road passes, is rivetted by a very fine perpendicular wall of dry masonry. At the foundry there is also a strong stone wall outside of, and sustaining, the embankment.

The second arched culvert is immediately at Mason's foundry, for the delivery of the Foundry stream aud for a road-way. The arch does not ap-

pear to have yielded at any place, but several of the ring stones, which are of the Aquia creek stone, have broken or split off at their outer surfaces. The sheeting is of rubble work, and many of the stone, for such work, do not appear to have been well chosen. The use of a great deal of mortar is evident from the intrados of the arch, and it is also apparent in places, that the beds of the sheeting stone are not sufficiently extensive.

We know it to be a common practice with builders in our country to use rubble stone for the sheeting stone of arches, but, in cases with as great a span as this arch possesses, and in which the work has to support a canal, we doubt the propriety of the practice. Even in arches of a less span, where rubble stone sheeting is used, great care should be bestowed on the choice of the stone, and in laying it.

The water had been let in a few days before our visit, to a depth of three feet over this culvert, but had been drawn off the day before, in consequence of a slight breach in the embankment a short distance above. When we examined it, there were but two or three inches of water left upon it. It leaked, however, considerably, perhaps sufficiently to justify fears of its stability, when exposed to a full pressure of seven feet water, unless some precautionary measures be taken. There was no crack or rupture in the masonry, the leak was between the stones of the sheeting and of the upper abutment.*

The level is continued from lock No. 4, in Georgetown, to lock No. 5, near the Little Falls, throughout a distance of about four miles. We have already spoken of as much of this level as extends up to the culvert at Mason's foundry, from which, up to lock No. 5, the great dimensions of the canal are preserved. The side of the canal next to the river is sustained by a heavy and high embankment, rivetted at its base by a substantial stone slope wall wherever it is exposed to the action of the river, and the interior slope of this embankment is lined throughout nearly the whole of this distance, by a stone wall, rising from the bottom of the embankment, and resting upon its slope. The opposite bank of the canal, over which the road to the Little Falls passes, is sustained by a well constructed perpendicular wall wherever the road is immediately adjacent to the canal, and where it extends back a short distance, the bank is generally rivetted by a slope wall.

Between the foundry culvert and lock No. 5, there are two or three places where small streams are let directly into the canal. We do not consider this a good plan. From the precipitous character, and the loose texture of the hills which are drained by these streams, the deposite from them into the canal will be considerable, and a filling up in the form of bars or shoals must be a consequence.

When it is not considered advisable to construct culverts for such streams, we think some method should be adopted to catch the deposite before it arrives into the canal.

The stream of Ewell's powder mill passes under the canal by means of an arched culvert.

Culverts are not only advantageous for these immediate objects, but also to deliver the water from back drains, the formation of which we believe

*We have been informed, since our visit, that the puddle work over this culvert had cracked from too long an exposure to the sun; that it is now repaired, and that the water is again over this culvert to a depth of three feet, and that it does not now leak.

will be found necessary wherever the canal is located, at the base of this extensive range of hilly land.

Near the locks of the old canal, and which are within the distance heretofore stated, there is a roadway passing under the canal, for the convenience of the fish landing below the Little Falls. This structure is an arched stone culvert, with a span of fifteen feet three inches. A full head of water has been upon it for about nine months, but no leak is visible, nor is there the slightest evidence of yielding To all appearances, it is a well built and durable structure.

We omitted to mention that we first observed water in the canal at a point about one mile above Mason's foundry, from which it is in actual use up to the Seneca feeder.

A short distance below lock No. 5 is a wooden bridge, thrown over the canal, for the accommodation of the public road, to the Little Falls bridge. This is sufficiently elevated above the level of the canal to admit of the passing of the packet boat without inconvenience to passengers upon its upper deck. The structure is simple but substantial, and the towing-path is extended under it by means of a small bridge, so that there is no necessity of freeing the horse from the tow-rope while passing it.

Lock No. 5 is the first on the portion of the canal now filled with water. At the foot of this lock a feeder is taken in from the Potomac. This feeder is a part of the old canal, and receives its water at about half a mile from the lock, and above it. A well-constructed arched stone dam is here thrown across the river, to insure a sufficient elevation and supply of water. There is an island in the river where this dam is situated. The entire length of the dam, when completed, will be seventeen hundred and fifty feet. The distance from the eastern shore of the river to the island in the line of the dam is eight hundred and fifty-five feet, which is the extent of the dam now constructed.

Lock No. 5 is similar in its plan, dimensions, and materials, to those we have before spoken of. It appears to have been faithfully built, and is very tight.

The great dimensions of the canal heretofore stated terminate at this lock, beyond which the width at the water surface is sixty feet, and the depth six.

About twelve hundred feet above lock No. 5 is lock No. 6. The canal in this distance is judiciously located, and durably constructed. Lock No. 6 is similar to lock No. 5, and deserves the same commendation.

Between lock No. 6 and lock No. 7 the length of canal is about one mile and a half. In this distance much of the embankment is exposed to the action of the river, against which it is, however, carefully protected by a well laid and substantially built stone wall, resting against the slope of the embankment, and rising to its top.

The use of Aquia creek freestone appears to have ceased at lock No. 6. Lock No. 7 is composed entirely of granite, and has the appearance of faithful workmanship and of great durability.

About half a mile above lock No. 7 is a fine arched stone culvert for the passage of Cabin John creek. It has every appearance of being a faithfully executed piece of work, exhibiting not the slightest evidence of yielding or of leaking. It is one hundred and twelve feet long, the span or chord of the arch twenty-two, and its rise five feet. If any expression of regret might

be indulged in relation to this excellent structure, it would be that the span of the arch is not greater; its rise could not be from the level which was considered advantageous to preserve to the canal which passes over it. It has, in one instance, not been found adequate to the free delivery of the water of the creek, which rose above the embankment, and flowed into the canal. The freshet to which we now allude is believed to have been a very unusual one, and much increased by a simultaneous rise in the Potomac. The canal suffered no injury from the rise; but should this prove to be a property of this creek, of more frequent occurrence than is now anticipated, it may become advisable to construct another arched culvert near to the present one. We deem it, however, a duty, to the engineer, to add that this is one of those cases better to be known by experience than to have been readily anticipated.

From this culvert to lock No 8, which is one mile and a half, the embankment of one side of the canal again touches the river, but is protected from its action by a strong and well laid stone wall, rising to the top of the embankment.

Lock No. 8 is of the same dimensions, plan, and lift, as those below. It is the first with which we have met, which has the facing or front range of its walls made with the red sand-stone of Seneca creek. We consider this an excellent stone, and well adapted to the use to which it is applied; inferior, however, to granite. The quarries (as do all quarries,) furnish stone of various qualities, and great attention should be bestowed on the choice of the pieces. We were informed that these are, in all cases, subjected to a rigid inspection before they are admitted into the work: those exposed to our view were evidently well chosen.

From lock No. 8 to lock No. 9, the length of canal is 1,440 feet. The embankment next to the river is here again rivetted by a well laid and strong slope wall of stone, extending to its top, and the inside slope is also rivetted in the same way. Between No. 8 and No. 9 there are two well made arched stone culverts.

Lock No. 9 is somewhat different from those below, being laid entirely in cement mortar, and not grouted in any part. It had leaked a little from the front of the walls soon after it had been first used, but a careful pointing with cement had since entirely remedied this. We saw no leak whatever. This lock is built of granite, except the coping, which is of Aquia creek stone.

We have as yet made but few remarks on the method of building, as we mean to go into some details on this subject after we have completed a general itinerary of the line.

From No. 9 to lock No. 10 the length of canal is 300 feet. It has every appearance of having been well made

Lock No. 10 is built entirely of granite. It is a fine structure, extremely tight, and has every appearance of durability. We take this opportunity to remark that all the locks previously noticed were also tight. We saw no leaking or spouting from the walls, and we examined them immediately after each was emptied, when such defects, if they exist, will always show themselves.

From No. 10 to lock No. 11 the length of canal is 600 feet. Near to lock No. 11, and between it and No. 10, there is a skewed arched culvert for the delivery of Rocky run. This culvert had yielded in some of its parts;

but precautionary measures were immediately adopted, and it has since exhibited no indications of failing. It leaked rather too much in places, and we think it advisable to reconstruct the puddle work, from the base of the abutments around the entire arch, where the leaks appear. Its length is 152 feet, the span of the arch 12, with a rise of 6.

Lock No. 11 has its front ranges of the Seneca stone, its backing of rubble granite. A small stone flume was being made around this lock to feed the lower level. This course is to be adopted for all the small pools.

From No. 11 to lock No. 12, the length of the canal is thirteen hundred and twenty feet, and is well made.

From No. 12 to No. 13 it is three hundred feet long, by seventy feet wide, and the same from No. 13 to lock No. 14. The engineer was constrained to have these small pools from the peculiar character of the ground. The locks are well built, are entirely of granite, and of the same dimensions and plan as those previously noticed, except No. 13, which passes the water through the gates, and not by a culvert through the side walls.

The canal is now continued at the same level, without interruption, for about four miles, to lock No. 15. In this distance, a well built arched roadway passes under the canal. The whole of this level is well chosen, and the work well executed. The embankment, which frequently encroaches on the river, is protected by a well built slope wall of dry masonry, rising to its top, and occasionally forty feet in height. This wall is made unusually strong not only to sustain the pressure to which it is exposed, but also because it was the most convenient and economical way of disposing of the vast quantities of stone which had to be blasted out of the path of the canal in its vicinity.

Lock No. 15 has the front ranges of its masonry faced with the red sand stone of Seneca. It is free from any leak, shows no yielding in any part, and appears to have been faithfully built.

The length of canal, from No. 15 to lock No. 16, is about two hundred and forty yards. No. 16 is similar in plan, materials, and mode of construction, to No 15, and equally creditable to the builder in its appearance.

From No. 16 to lock No. 17, the distance is four hundred and twenty yards. Here, again, the embankment had to encroach upon the river, from the action of which it is protected by a heavy slope wall of stone, continued up to the top of the embankment, and in places it is as high as fifty-six feet. This wall had partially yielded to the great pressure to which it is exposed, but was immediately repaired and enlarged, and is also aided by strong and well built butresses.

In these cases, where the wall is stated as being so high, rows of plank piling were driven on the inside, and the canal filled up with earth, and secured by a puddle work. Where the deep places widen into large ponds, as in the vicinity of Bear Island, the inside of the embankment is judiciously and carefully secured by plank piling, and by a puddle wall.

Between No. 17 and lock No. 18, the canal is widened into a capacious pool, at the upper end of which it receives a feeder from the Potomac. This pool is three hundred feet long by one hundred feet wide.

Between No. 18 and lock No. 19, the length of the canal is three thousand one hundred and ten feet, and is well executed. These last locks (except 19) are all similar to each other, and to those previously noticed. The front range-work, with hammered faces, of the Seneca stone—the backing

of rubble granite. And lock No. 19 differs from these only in its lift, which is nine feet.

From No. 19 to lock No. 20, the distance is four hundred feet.

This last lock has the general lift of the locks of this canal of eight feet, and completes the series necessary to surmount the elevation of the "Great Falls" of the Potomac.

The line of the canal from the Little Falls to this lock was replete with difficult passes, which the engineer appears to have attacked with boldness and intelligence, and to have admirably surmounted.

At this lock we found an excellent hotel, kept by Mr. Fenlon. The house is built upon the ground of the company, and with the company's funds, and is a necessary and great accommodation to those who visit this interesting work.

From lock No. 20 to No. 21, the length of the canal is two miles and a quarter. It is a carefully executed piece of work. The embankment, wherever exposed to the river, is protected from its action by a well constructed and substantial wall of dry masonry, and generally rievetted also on the inside slope, by a wall rising from the bottom of the canal.

Between No. 20 and lock No. 21, there are two well constructed culverts, which appeared to be perfectly tight, and of an enduring character.

Lock No. 21 is similar to those previously noticed, and has all the appearances of faithful work, is tight, and exhibits no evidence of yielding.

There is an arched culvert near the head of this lock, in which we observed two or three places where it leaked. It appeared to require some attention.* There are also, between 21 and 22, two other small arched culverts, perfectly tight, and with every appearance of faithful workmanship. We observed also in this distance, a paved ford to accommodate the adjoining farms. This ford can be conveniently used when the water in the canal is about four feet deep—when deeper, it is contemplated to use a large boat at this place, for which purpose docks are constructed on each side of the canal, that the boat may lie out of the canal line. Within the limit before stated, there is also a culvert for the delivery of Watts's branch. This is a large arched culvert, and to all appearances well built. Not the least leaking was visible. Its length is one hundred and fifteen feet—the span or chord of the arch twenty, with a rise of ten feet. The length of canal line between locks 21 and 22 is three miles. Throughout the greater part of this distance, the embankment on the river side is sustained by a beautiful and well built sloping stone wall of dry masonry, resting upon a judiciously laid footing, and rising to the top of the embankment, the inside slope of which is rivetted also with a slope wall, laid from the bottom of the canal. There is one continued line of two miles of this walling, curving with the canal, in which we did not observe the slightest indication of yielding or of weeping in any part of it. In parts of this line the rock excavation was very great, and the superfluous stone is judiciously placed outside of the walling, and in a manner to relieve it from the current of the river.

Lock 22 has a lift of seven feet, but is in other respects similar to those which we had previously examined. Between this lock and No. 23 the

* We have since understood that it has experienced a slight breach, and is now undergoing a thorough repair. But in candor we must add, that we saw no sufficient grounds for apprehending any such disaster.

length of the canal is three miles. It is a well executed piece of work, having much of its embankment protected from the river by a well laid stone wall, founded upon a broad footing.

A short distance beyond No. 22, there is a well made arched culvert for the delivery of Muddy branch. It rests upon a rock foundation, and shows no leak or evidence of yielding.

Lock No. 23 is the next which we examined, and the last in the extent of the canal, now filled and in active use, constituting, in its present condition, a distance of about twenty-one miles of canal navigation. We have already remarked upon the appearance and execution of the work thus far, and have spoken generally of the dry walling. We were particularly struck with the extent and excellence of this part of the work, and of the judicious collection in places of the superfluous stone, forming masses projecting into the river, and aiding to turn its current from the walls. But there were places where the superfluous stone were thrown indiscriminately over the wall, and allowed to take whatever course they would, covering the wall irregularly from its base. This had a very unfinished appearance, but it was the most economical disposition which could be made of the stone, and aids the wall in its resistance. The stone were thrown over in a manner to avoid injuring the wall; and where this method of disposing of the stone was observed, it was at places where any violent action of the river is not to be apprehended.

Lock No. 23 has a lift of eight and a half feet, and immediately adjacent to it is a guard and lift-lock, No. 24, communicating with the Potomac river.

These two locks were laid throughout with the cement, or hydraulic mortar, and no grout was used. The facing, or front ranges of masonry, are of the red sand-stone of Seneca. They had the appearance of faithful workmanship. We were informed that at one time a spouting of water had been observed from the side-walls of these locks, immediately after being emptied; but we observed nothing of the kind when we examined them.

The canal is fed from the river through the guard and lift-lock No. 24. It is generally called the Seneca feeder. An arched stone dam, two thousand five hundred feet long, and adapted to raise the water six feet above low water mark, is here thrown across the river, and directs the water into the lock. The chamber of this lock is of the same size as that of the lift-lock. It is in active use in passing boats between the canal and the river, and bestows the advantages of the canal to the country on both shores.

The method of admitting the water into all the lift locks we have passed, is, with one exception, by a walled well and culvert, constructed in the masonry of the side-walls of the locks. The discharge into the lock-chamber is by three rectangular openings on each side of the locks, under the water, and at the bottom of the lock. The opening into the well from the level above, is regulated by a cast iron paddle-gate, turning on a pivot.

This plan admits the water without violent ebullition, and avoids a forcing of the boat against the gates. We found it generally agreeable to the officers of the canal, but that the frequent breaking of the paddle-gates were subjects of complaint. This method, though often alluded to by writers on these subjects, has not, we believe, been elsewhere so generally adopted, nor do we consider it as having any marked advantages over that now frequently followed, of having the upper gate to extend to the bottom of the

lock, and of admitting the water through the lower part of the gate, by a common pivot-valve, or by a valve raised by rack-work.

The admitting of the water by a well and culvert lessens the strength of the side-walls, requires more care in workmen than is usually obtained, and a more vigilant inspection of the work. The passages are liable to be choked up by billets of wood and by stones; and the plan presents difficulties, and occasions great expenses, when repairs are required, while it, at the same time, exposes a greater surface to accidents. For ourselves, we think the more simple these structures are, and the more accessible to repair, the better.

The gates of the locks are tight, well made, and remarkably well hung. They fit to the hollow quoins with great exactness, are well balanced, and generally move with ease. We were particularly struck with the secure anchoring of the upper hinge. The irons extending well over the masonry, and being imbedded and firmly bolted to it.

The usual time employed in the passing of a lock by the packet-boat is four minutes. A passage, however, may be readily effected in three minutes and a half, and and we are informed that, in an experiment of several passages, the average of the time occupied was but three minutes.

We observed many well constructed waste-gates, but there appeared to us a singular deficiency of waste-weirs. We consider these last as necessary to the security of a canal, as they act of themselves and discharge the superfluous water before it can rise so high as to overflow and injure the embankments.

We now proceeded to examine the work above the Seneca feeder. As the construction of this part of the canal is in progress, it afforded us an excellent opportunity of witnessing the excavations and the methods of building.

The trunk of the canal is excavated, and the embankment nearly finished, from the feeder, (or from lock 23 of the canal line, which is the lift-lock adjacent to the feeder,) to the Seneca river, a distance of about three-quarters of a mile.

Over this river an aqueduct is constructing. The abutments and piers, which rest upon a rock foundation, are completed, the centering is up, and the arches partly turned. The masonry is to be entirely of the red sandstone of Seneca.

The length of the aqueduct, from the face of one abutment to the face of the other, is one hundred and fourteen feet. It will consist of two piers and three arches. The span of each arch is thirty-three feet, and the thickness of each pier seven feet. The sheeting, as well as the ring stone, are to be cut to the proper angle, and the whole of the arch work is to be laid in cement, and grouted carefully over the extrados. The front or facing ranges of the piers and abutments, is laid in cement, or hydraulic mortar, and the interior of the masonry carefully grouted with cement at every range. No stretcher is admitted with a bed less than its face, and no face is less than a foot wide, and the length of each stretcher must be not less than four feet. No header is admitted that does not extend into the masonry at least four feet, and with a face one foot high and two feet long. The spandrills are to be built with rubble stone, and grouted with cement at every range.

The stone, before being used, are subjected to a rigid inspection, and if an improper piece finds its way into the work, it is ordered out as soon as discovered.

The masonry of the lower abutment of the aqueduct is connected with a lift-lock, and the width of the canal over the aqueduct is the same as that of a lock chamber. This lock, No. 25, was also in progress.

We believe that this structure will be both beautiful and enduring, and that it presents the best method of passing the stream, even if its water should hereafter be wanted to feed the level between the aqueduct and lock 26.

From the aqueduct, we passed along the excavated part of the canal to Horse-pen run. A culvert was constructing for the delivery of this run, the abutments of which are completed. The stone used are well selected and well laid. Another culvert, at a short distance above this, had its abutments partly raised.

We then continued our examination up to lock No. 26. This lock is eight miles beyond the Seneca aqueduct. Nearly the whole of the excavation in this distance is completed, the tow-path formed, and the culverts in a state of active execution.

Lock No. 26 was nearly completed, the walls were up, and in want only of a part of the coping-stone, which the workmen were then laying. The timber for the gates was also framed and ready to be put together. The whole of this work had the appearance of faithful execution, and a judicious choice of materials.

A pivot bridge is to be thrown over this lock, to accommodate the road to Edwards's ferry. This bridge was made and ready to be placed upon the lock.

Near to the head of this lock, there is a well built arched culvert, for the passage of a small stream, and for the convenience of a back drain. The foundation of this is of timber, and so situated as to be always under water. Each end of the culvert is protected by a firmly driven series of plank-piling, extending five feet below the foundation. The masonry is laid in hydraulic mortar, and then grouted, and the whole is to be covered by a puddle work, which last yet remained to be completed.

About one mile beyond lock No. 26, there is constructing an arched stone culvert, for the delivery of Broad run. It will have a span of sixteen feet. The masonry of the abutments is completed and ready to receive the skew-backs. The abutments appeared to be well laid, and the stone used equally well selected.

Broad run may be taken in as a feeder, at a point about three-quarters of a mile from the canal.

A short distance from the last, there is another culvert of six feet span, for the delivery of Abraham's branch, and soon again another of four feet span. This last is finished, and is a good piece of work.

At Hillary's farm, the pit for an arched road-way was dug out, and preparations were in activity for the construction of the work. About 500 feet further on, there is another arched culvert of six feet span, for the delivery of a small stream, and also to accommodate the back drains. This culvert was being built, and showed good work, and well chosen stone.

One mile from the road-way at Hillary's farm, another arched road-way is in progress. The work was completed to the height of the abutments, and is a fine specimen of masonry. The passage between the abutments is ten feet wide. The centering is to be erected, and the arch completed immediately.

Three quarters of a mile further, a pit is excavated, and part of the foundation laid for another road-way, intended for the convenience of Conrad's ferry. As much of the masonry as is executed deserves commendation.

We cannot forbear here expressing our decided approbation of this method of crossing canal lines, over the more usual method by bridges. Its many conveniences to those who use these road-ways, as well as to the canal, should in all cases give to them a preference, where the ground is adapted to their construction.

The next lock above is No. 27, and is eight miles from No. 26. We have already enumerated the works of masonry in this last distance, and have described the state of forwardness in which we found them. One or two small culverts, for drains, completely finished, have escaped particular remark: we looked at them, however, and found them, to all appearances, well executed. The excavation of the canal trunk, and the formation of the tow-path, were also advanced. In fact, the earth to be removed appeared to us but little more than was necessary to form the embankments and the canal over the several works of masonry in progress, and we were informed that it was left for these purposes.

Lock No. 27. The pit of this lock was completely excavated, the foundation laid, and some of the masonry raised a few feet. The stone were well chosen, and the joints of the range work square and close. The work was progressing actively, and in good faith.

We examined, at the same time, a quantity of stone brought for the use of this lock, and lying on the river bank. They were of the red sand stone of Seneca, and are remarkably fine pieces.

A short distance above this lock there is a skewed culvert constructing, for the passage of a small stream, and also to answer for a road-way. The abutments of this work are completed and ready for the skewbacks, and have every appearance of faithful work.

Mr. Cruger, the engineer for this part of the line, also showed us the ring-stone prepared for this arch, and explained, in an intelligent and satisfactory manner, the principles on which they were cut.

About half a mile beyond this culvert there is another, for the passage of a small stream. This, excepting a few ranges of the wing-walls, was completed, but not yet covered with earth, and was entirely exposed to our view. The work had a very enduring aspect, and every appearance of faithful execution.

The entire distance between the last lock and No. 28, is two miles, in which the excavation of the canal was also nearly completed.

Lock No. 28 is rather more advanced than No. 27, and shows similar evidence of faithfulness in its execution.

From No. 28 to the aqueduct over the Great Monocacy, is about half a mile. On this distance we passed the Little Monocacy, for the delivery of which a culvert is being made. The foundation is laid, and the walls of the abutments are nearly completed. The stone used in this work are fine, and it has every appearance of durability.

Between this and the aqueduct over the Great Monocacy, the canal is to be enlarged into a basin 500 feet long by 100 feet wide.

It may be proper to remark, that, in the whole length of the canal from the aqueduct over the Seneca to that over the Monocacy, wherever the embankment touches upon the river, it is carefully protected against its action by extensive and well constructed walls of dry masonry.

These walls, so frequently mentioned in our report, might, without explanation, be considered objects of extravagance; we will therefore add, that the valley of the river, occupied by this canal, is bounded, to a great extent, by high, rocky cliffs, which, in many places, project into the water, leaving to the engineer no other course than to blast his path through them, and to establish the foundation of his embankment in the river itself.

The next object of our examination was the aqueduct over the Great Monocacy. This structure is 438 feet long from the face of one abutment to the face of the other, and the masonry of the abutments and wing-walls extends ninety-six feet further. The whole work will consist of two abutments, six piers, and seven arches. The masonry of the abutments and piers rests upon the solid rock which forms the bed of the river, and which had been previously cleaned and prepared for the purpose.

The arches are to be fifty-four feet in the span, with a rise of nine feet. The two arches which rest against the abutments are conducted within the abutments, by what is called a blind arch, down to the rock foundation. The centering of one arch is up, the masonry partly laid, and preparations were in activity for erecting other centres.

The piers and abutments are thirty-three feet four inches long, exclusive of the pilasters. The piers are ten feet wide above the water table, and fourteen feet wide and thirty-eight feet long at the foundations, which last dimensions are preserved up to within one foot of the low water surface.

These piers (except one) and the abutments are now erected, and nearly in a condition to receive the skewbacks.

When the masonry is brought up to the point before stated, an offset is constructed entirely around each pier and the faces of the abutments, after which the range work, with hammered faces, commences.

The first course of range work is twenty-six inches high, and reduces the abutments to thirty-three feet four inches long, and eleven feet thick. The second is twenty-four inches high, preserves the same length to the abutment, but reduces its thickness to ten feet. There are then three additional courses, one of twenty-two inches, one of twenty inches, and one of eighteen inches high, which bring the piers and abutments to the desired elevation for receiving the spring stone or skewbacks of the arch. The work of these piers and abutments is a system of headers and stretchers, except the interior or backing, which is composed of rubble stone. The stretchers are four feet long, and none are admitted with a less width of bed than two feet. The headers have a front two feet long, and have to extend not less than five feet into the masonry. Their beds are all cut so as to be parallel. This range work is laid in cement or hydraulic mortar, and the interior or backing carefully grouted with the same material.

The ring stones of the arches are cut by a pattern furnished to the contractor, and are to extend into the masonry three feet, and five feet alternately. The depths of these stones are so arranged as to be three feet at the spring of the arch, and to decline gradually to two feet six inches at the crown.

The sheeting stone are also cut to the same angles as the ring stones, and to range well with them.

The whole of the arch masonry is also to be laid in hydraulic mortar, and the entire extrados of the arch is then to be carefully grouted.

The canal passage is to be eighteen feet six inches wide at the bottom, and nineteen feet six inches at the water-surface, with a depth of six feet.

The work when completed is to be surmounted by an iron ballustrade.

Mr. Cruger, the resident engineer, showed to us also the specfications of this work, (which form a part of the contract with the builder) describing the manner in which it was to be executed, and the dimensions of its various parts. We observed at the foot of these specifications, the name of the celebrated civil engineer, Judge Wright, who was formerly in the employ of the company.

A temporary railroad has been constructed to the quarry, from which the stone for this work is obtained, and which is situated about three miles back from the river. We visited the quarries. The stone lies high, and is of easy access; its color a dull white. It is of the kind usually called by workmen mountain granite, but by geologists it would be called a gray wacke. It splits well, hammers without fracture, is fine grained, and, in our opinion, a very lasting stone.

The work was executing in good faith by the contractor, and was vigilantly watched and inspected by the engineer. We consider the plan judicious as well as its execution, in which are united the true principles of economy, usefulness, and durability.

After having completed this examination we crossed the Monocacy, and continued up the excavated part of the canal. A short distance beyond the Monocacy there is an arched culvert for the delivery of the Little Tuscarora. It extends one hundred and thirty feet under the canal and its embarkments, with a span of twelve feet. It has every appearance of faithful work. One and a half miles farther there is another culvert of sixteen feet in the span of the arch. In addition to the delivery of a small stream, this culvert is also intended to serve for a road-way. It is about half done, and is a well executed piece of work. From this we continued to the "Point of Rocks," where the excavation for the canal at present terminates, and near to which there is another arched culvert completed and well executed. In all this distance from the Monocacy, of five and a half miles, in which there is no lock, the canal trunk is excavated, the tow-path formed, and the works of masonry in a state of forwardness; and, with the exception of the Monocacy aqueduct, we see no reason to doubt that the entire line from the "Point of Rocks" to the Georgetown basin, a distance of about forty-eight miles, might be in readiness without extraordinary exertions, to receive its water by November next. Our doubts in relation to the completion of this aqueduct, by the time just stated, arise more from the severity and length of the sickly season in that locality, than from any opinion that this work is not also within the limit of ordinary exertion.

All the lock-keepers' houses are good stone structures, with one exception, and this is a good frame house.

The tow-path, throughout the entire line, is upon the embankment next to the river, and is no where less than twelve feet wide.

We have already spoken, in the course of this narrative, of the method pursued in building the aqueducts; we will now add, generally, that which is followed in relation to the culverts and the locks.

In all cases where a rock foundation can be conveniently obtained, it has been resorted to; the rock carefully cleaned, its loose and defective parts removed, and the required extent of surface leveled to receive the masonry. Where the rock was not accessible, and the earth, after excavation, did not appear sufficiently firm, it was carefully rammed and paved with stone, before

the timber foundation for the masonry was laid. Where the earth was judged to be sufficiently firm, the timber was at once laid upon it without further preparation. And in proof that the foundations have been carefully secured, we can bear our testimony that, in no instance whatever, except in the tide-lock, and in lock No. 1, at the Georgetown basin, did we perceive any yielding of the masonry, which could be attributed to any defect in the foundations.

The curve of the culvert arches is generally a semicircle: where the span is four feet, the average thickness of the arch is fourteen inches; where the span is six feet, the average thickness of the arch is eighteen inches; where the span is eight feet, the average thickness of the arch is twenty inches; and where the span is twelve feet, the average thickness of the arch is twenty-four inches. The sheeting stone of these arches is rubble stone; but all are to have good fair beds, with their joints dressed with the hammer, each stone having a good binding length. The sheeting is laid in hydraulic mortar, and then grouted with the same material; and the whole, including the abutments, is protected with a puddle-work two and a half feet thick.

The ring stones of the culverts are carefully cut, and have hammered faces. Those for a four foot span, are twelve inches deep; for a six foot span, fourteen inches deep; for an eight foot span, sixteen inches deep; and for a twelve foot span, eighteen inches deep. These stone are required to extend into the arch, alternately, from fifteen to thirty inches, in culverts of a four foot span, and from twenty to forty inches for those of a greater span. For the wing and parapet walls the stone have hammered faces, are well bedded and jointed, and the work is surmounted by a coping ten inches thick and two feet wide.

These culverts are all of an admirable length, extending well and sufficiently through the embankments.

When the pit is prepared for a lock, a strong frame of timber is laid, united and leveled. This frame work consists of ninety pieces of timber, eighty-two of thirty feet in length, and eight of thirty-eight, squaring ten inches by twelve. The whole is then covered by a course of two and a half inch plank, well secured to the timbers. A second course of planking is also laid from above where the culvert opens into the lock, to three feet below the lowest opening of the culvert. Three courses of plank piling are driven five feet below the timber frame, one at the head, one at the foot, and one at about the centre of the frame work, before the planking is applied. This frame-work extends over a width of thirty feet, and a length of one hundred and forty-one, and is the prepared foundation for the masonry. The main walls of the lock are seven feet thick, with a buttress of one foot from the head to three foot below the lowest opening from the culvert, and are continued at this thickness for a height of three feet. The wall then falls in one foot, but not the buttress, and maintains this thickness of six feet to its top.

All the facing stone in every part of the lock exposed to view, is cut and coursed with parallel beds. No range is admitted less than one foot thick, nor with less bed than its face, and each stretcher is to be four feet long. A header is required to every ten feet, to extend not less than four feet into the wall, and to be two feet long at its exposed face. The coping stone are not less than twelve inches thick and three feet wide.

After the masonry is finished, an additional course of two inch plank is laid

throughout the whole of the chamber, and below the lower gates, and an embankment of earth is raised against the back of the walls and up to their height.

The range-work of these walls is laid in cement or hydraulic mortar; the backing, or dead wall, which is of rubble stone, is carefully grouted with the same material at every range.

These are the general principles and methods which have governed in the masonry of this canal, varied, in some instances, according to the discretion of the engineer. We are assured that they have been the guide in such works as have been completed, and we had proof in our examination that they were observed in such as were being made.

There is no lock built upon an inverted arch.

We are fully aware, that, after all we have said, we have not yet given an adequate idea of the great and interesting work we have been directed to examine. The difficulties which have been surmounted—the quantity of labor it has received—the vast amount of rock excavation—the extent and excellence of the walls of dry masonry—the durable aspect of all the structures—the great and imposing dimensions of the canal—the judicious adaptation of the excavations to the fillings and embankments—can be duly appreciated only by visiting the work.

The trade of the canal in the part now in use is very active; there is, however, a necessity for a system of regulations to govern the boatmen. The use on the canal of the iron pointed boating poles should be entirely and immediately prohibited.

In our examination we were accompanied by Mr. Purcell and Mr. Cruger, resident engineers, and Mr. Vanslyke, superintendent of repairs.

Mr. Purcell accompanied us throughout the extent under his charge, from the basin at Georgetown, to three miles beyond the Seneca; and Mr. Cruger, who joined us at the Great Falls, remained with us until we completed our examination at the Point of Rocks. We are under many obligations to these gentlemen for their polite and intelligent attentions. They drew our notice to every part of the work—were anxious that it should undergo the most minute inspection—and pointed out to our attention those parts at which some defects had been discovered, with the confidence of men who were conscious that all usual care had been bestowed in the first instance, and that any liberal and intelligent mind would attribute these defects to their proper causes.

In stating the extent which these gentlemen superintend, we desire to be understood as merely referring to circumstances at the period of our visit. We do not know how long each has had the parts stated under his charge, nor what changes in this respect have ever been made. Our object is not to attach responsibility or praise or blame to any one, but merely, in giving a simple narrative of what we saw, and its condition, as free from personal application as possible, to name the officers of the company who were with us, and to whom we are indebted for so many of our facts of distances and dimensions.

The resolution of the board of canal directors, which accompanied your order, repuested also an investigation of the cost of the canal. We find that were we to enter upon this subject, it would much delay and much extend our report, which may already be considered as having arrived at a repulsive length. We have therefore to request that this part of the exami-

nation may not be insisted upon, and the more especially as the board itself furnishes frequent and authentic statements of the expenditures.

There remains now but one subject for our remarks, and that is the general plan of the canal, by which we mean its location, and its dimensions, breadth, and depth. The location involves considerations of cost—of security from freshets, and of unembarrassed construction of the culverts and aqueducts. We have not yet collected the data which would justify us in any other opinion on this point, than that from appearances all these considerations have been duly weighed by the engineer. In relation to the width and depth, we will merely say, that, as engineers, we would have been perfectly satisfied had we found these to have conformed to the advice of the United States' Board of Internal Improvements, as expressed in its able report of October, 1826, and we think it may yet be found expedient to adopt these dimensions above Harper's Ferry.

Respectfully submitted.

WASHINGTON, *June* 13, 1831.

JOHN J. ABERT,
Lieutenant Colonel and Topographical Engineer.
JAMES KEARNEY,
Lieutenant Colonel and Topographical Engineer.

To. Brig. Gen. GRATIOT,
Chief Engineer, U. S. A.

D.

Extracts from the Address of John Grahame to the Canal Proprietors, and the Traders on the Canals, in the line of the projected London and Birmingham Railway.

"The Liverpool and Manchester Railway Company, in their competition with the water carriage, have obtained but a very trifling proportion of traffic from the canals. The profits (if any have actually been made by the carriage of goods on the Liverpool and Manchester railway) are extremely small; yet the water distance between Manchester and Liverpool is nearly double the railway distance; and, instead of possessing the regularity of canal conveyance, is, for eighteen miles of this additional length, subject to the winds and tides of the Mersey. Nevertheless, of an amount of nearly fourteen hundred thousand tons annually, for the carriage of which the directors of the Liverpool railway were desirous to provide, before their railway was opened, little more than an eighteenth part, including the entire road traffic, has been as yet obtained for the railway; and the expenses of carrying this fraction of the trade have been so enormous as to make it doubtful whether the Railway Company do not suffer a regular loss on their carrrying trade, which is defrayed from their profits as coach masters." (Note B, appendix.)

"However incredible it may appear, it is certain that canal passengers can be carried at a speed of ten miles an hour, with a degree of ease, comfort, and safety, such as no other conveyance can give, and at a charge (if required by competition) not much more than a tenth of the cost of railway travelling.

"These facts, so different from general belief, have only been completely ascertained during the course of the last two years. They are consequent

on the detection, by practice and experience, two fallacies which had been held out to the public, and received as undoubted truths.

"The first of these fallacies was, that it was impossible to propel a boat, carrying any considerable number of passengers, along a canal at a high speed, without incurring an enormous expenditure of money and power, and without occasioning a wave or surge which would wash down the canal banks. (Note C, appendix.)

"The second fallacy was promulgated by certain engineers connected with railway projects, and is as follows, viz., that, in proportion as the speed on a railway was increased, the expense of conveyance was diminished, as the engines by doubling their speed could in the same time do double work. (Note C, appendix.)

"Now the first fallacy, viz., the alleged impossibility of moving at a great velocity through canals, and the certainty of the destruction of the canal banks by the swift passage of canal vessels, have been proved to exist in imagination only. A speed of ten miles an hour has, for the last two years, been maintained in the carriage of passengers on one of the narrowest canals in Britain, without raising a ripple on the banks even where the vessel carried upwards of one hundred passengers, or as many as are carried in a train of coaches on the Liverpool and Manchester railway.

"The expenses or cost of obtaining this speed are so trifling, that the fares per mile are in these quick boats just one-half and one-third of the fares in the Liverpool railway coaches, while at these low fares the profits are such as to have induced the boat proprietors to quadruple the number of boats on the canal.

"On the other hand, and in respect of the second fallacy, although it be true that the extraordinary velocities obtained on the Liverpool Railway have fully come up to the expectations of the projectors, yet the expenses instead of being diminished (according to the dicta promulgated by engineers,) have been enormously increased, and have gone so far beyond all previous calculation, as to make it doubtful whether the Railway Company will not ultimately find that, agreeable to an Irish phrase, they have gained a loss.

"As respects canals, the experiments of great velocity have been tried and proved on the narrowest, shallowest, and most curved canal in Scotland, viz. the Ardrossan or Paisley canal, connecting the city of Glasgow with the town of Paisley and village of Johnstone, a distance of twelve miles. The result has disproved every previous theory as to the difficulty and expense of attaining great velocities on canals; and as to the danger of damage to the banks of canals by great velocity in moving vessels along them.

"The ordinary speed for the conveyance of passengers on the Ardrossan canal, has, for nearly two years, been from nine to ten miles an hour, and although there are fourteen journies along the canal per day, at this rapid speed, the banks of the canal have sustained no injury; indeed injury is impossible, as there is no surge. The boats are formed seventy feet in length, about five feet six inches broad, and, but for the extreme narrowness of the canal, might be made broader: they carry easily from seventy to eighty passengers, and, when required, can, and have carried, upwards of 110 passengers. The entire cost of a boat and fittings up is about £125. The hulls are formed of light iron plates and ribs, and the covering is of wood and light oiled cloth. They are more airy, light, and comfortable, than any

coach: they permit the passengers to move about from the outer to the inner cabin, and the fares per mile are one penny in the first, and three farthings in the second cabin. The passengers are all carried under cover, having the privilege also of an uncovered space. These boats are drawn by two horses, (the prices of which may be from £50 to £60 per pair,) in stages of four miles in length, which are done in from twenty-two to twenty-five minutes, including stoppages to let out and take in passengers, each set of horses doing three or four stages alternately each day. In fact, the boats are drawn through this narrow and shallow canal at a velocity which many celebrated engineers had demonstrated, and which the public believed to be impossible.

"The entire amount of the whole expenses of attendants and horses, and of running one of these boats four trips of twelve miles each, (the length of the canal,) or forty-eight miles daily, including interest on the capital, and twenty per cent. laid aside annually for replacement of the boats, or loss on the capital therein invested, and a considerable sum laid aside for accidents and replacement of the horses, is £700 some odd shillings, or, taking the number of working days to be 312 annually, something under £2 4*s.* 3*d.* per day, or about eleven pence per mile. The actual cost of carrying from eighty to one hundred persons a distance of thirty miles (the length of the Liverpool railway,) at a velocity of nearly ten miles an hour, on the Paisley canal, one of the most curved, narrow, and shallow canals in Britain, is therefore just £1 7*s.* 6*d.* sterling. Such are the facts, and, incredible as they may appear, they are facts which no one who inquires can possibly doubt.

"As respects railways, the experiment of high velocities has been made, and the result ascertained on the best finished and finest line of railway in Britain, connecting the two great towns of Liverpool and Manchester, without a single curve from end to end, and with only two short ascents.

"The result of this experiment on the Liverpool railway has been somewhat different from that on the Ardrossan canal. On the railway, indeed, the expected velocities have been fully attained, and the calculations of the engineer, in this respect, satisfactorily demonstrated as possible and correct; but unluckily one very important matter had not been admitted into the calculation, or rather had not been supposed to exist, viz, the probability, or rather certainty, of a great increase of expense consequent on increased speed. The geometrical ratio of increased resistance on increasing the speed on canals, has been transferred to the increase of expense on increasing the speed on railways, with this addition, that the increase of expense affects not merely the moving power, or locomotive engine, but the coaches, wagons, and roadway. The ordinary speed of conveyance on the Liverpool railway is from ten to twenty miles an hour, and depends much on the weather and the weight dragged. The railway engine, with its tender for carrying coke and water, costs about £1000, and drags after it a train of eight coaches, the cost of each of which, if the same as in the estimate for the London and Birmingham railway, should be £200, or a train of first-class coaches, with accompanying engine and tender, costs £2,600. The coaches accommodate one hundred and twenty passengers. There are other coaches, and also uncovered wagons, which travel at an inferior speed, and which will cost less. The fares are various; seven shillings, or nearly threepence per mile for each passenger, in the best coaches, and five shillings, or

twopence per mile, for each passenger in the common coaches, of what is called the "first train," being just double and triple the Paisley boat fares; and four shillings in the coaches, and three shillings and sixpence in the uncovered wagons in what is called the "second train," which move at a lower velocity. The lowest railway fare to the traveller is therefore three halfpence per mile, in an open, uncovered wagon, moving at an inferior speed, exposed to wind and rain, and the steam and smoke of the engine—or double the fare on the Paisley canal, for being carried in a comfortable cabin under cover."

"The Paisley canal boats have now been at work plying on that canal since the autumn of 1830, and it is found that they are as easily and safely drawn at the high velocities before mentioned, during the night as during the day. The accidents on the Liverpool railway have been so frequent and so serious as to require the notice of the directors in the reports, whilst not even the semblance of an accident has happened with the Paisley boats."

"Although I have principally confined myself to the article of passengers, yet all I have stated applies equally to the light goods now sent by the road wagons and vans.

"With two horses it has been shown that a weight equal to nearly eight tons, in passengers, may be conveyed along a narrow and shallow canal at a rate of nine or ten miles an hour, and at an expense of 11*d.* a mile, including every outlay, with interest and replacement of capital, being less than one-third of the bare cost for conveyance of a similar weight on a railway."

"*Note B—Appendix.* The entire trade contemplated by the directors, previous to the railway being opened, and for which they wished to provide means of conveyance between Liverpool and Manchester, was 1,248,000 tons; but the entire amount obtained in the year 1831 was 88,099 tons, of which 52,224 tons was carried in the last six months of 1831. The expense of carriage of these 52,224 tons was £21,841 4*s.* 10*d.*, so that if the entire amount of anticipated trade on the railway had been obtained, the actual annual outlay on the goods trade alone would have amounted to nearly £500,000 sterling, besides all the coaching disbursements; a sum far beyond the original estimated cost of the railway itself."

"*Note C—Appendix.* The last scientific work I am aware of, in which these fallacies, propositions, or data, are demonstrated to be true, is Mr. Wood of Killingsworth's book on railways. This book was republished about six months after the Liverpool railway was opened, and it is there demonstrated that it would take upwards of seventy horses to do on a canal what is now actually done every day on the Paisley canal by two horses; while it is in like manner demonstrated that the conveyance on the Liverpool railway was costing one-ninth of the amount which, at the end of the year, it was found to have done."

E.

GENERAL EXTRACTS.

Extract from a report of the President and Directors of the Baltimore and Ohio Railroad Company to the Legislature of Maryland, printed at Annapolis, 1831.

"The seventh proposition provided for the compromise of all existing difficulties along the entire distance of collision; that is, from the Point of Rocks to Cumberland. This was rejected altogether by the Ca-

nal Company, which would not agree to a compromise further than Harper's Ferry, beyond which point the exclusive right to prior choice of route was still claimed by it, under any circumstances.

"It was evidently immaterial to this company, whether the delay, consequent upon the litigation of the right of prior choice, took place at the Point of Rocks or at Harper's Ferry. There was no object to be obtained by reaching Harper's Ferry, which could justify the Railroad Company in constructing its road so far, if it was to be delayed there, by the continuance of the procrastination which the Canal Company had already caused to the chancery proceedings; or if, in case of a decision against it, it were stopped there altogether, more especially too, if it were prevented by the intervening canal from crossing into Virginia. The Point of Rocks was, in many respects, *as good*, and in some, a *better place to stop at*, or *cross the river*, than at Harper's Ferry; and the Railroad Company had, therefore, no inducement *to conduct the railroad into the disputed part of the route*, unless *a passage throughout* was secured to it, either by compromise, or by the decision of the proper tribunals. On the other hand, the canal would be a perfect work so far, when it reached Harper's Ferry, at which point it was proposed to erect the dam that was to supply it with water *for more than forty miles*; that is, *as far down as Seneca creek*, the *next feeder below*. The dam would back the waters of the Potomac and Shenandoah, and turn into the canal, as into a natural channel, the whole descending trade of both streams, no part of which could be expected to undergo the trouble aud expense of unloading, to be transported upon the railroad, terminating, too, as the latter would do, many feet above the canal, and directly against the bluff and inaccessible face of a precipice. While this was the case, *it could hardly be supposed* that the Canal Company, enjoying the whole trade of the Potomac and Shenandoah, would offer facilities to the railroad to ascend the former stream to any of the fertile valleys above, to intercept, on fair competition, a portion of their produce on its downward progress, much less allow it to accomplish its great object, a communication with the western waters: more especially, too, when, after having expended its whole capital of three millions and a half of dollars in reaching Harper's Ferry, and without the prospect of obtaining more from the General Government, the Corporations of the District of Columbia, or individual subscribers, the Canal Company would find itself unable to continue its work in competition with a company, the greater part of whose capital of four millions of dollars would be still untouched, and whose revenues enabled it to borrow to double the amount even of that capital. Under this view of the case, the policy of the Canal Company was too plain to be mistaken, and was too certainly anticipated to permit this company, without the greatest sacrifice of the interests in its charge, to accept the plan of a compromise at Harper's Ferry only, leaving the rest of the route to a litigation which, on the two works, at the last named place, it would become the most vital interest of the Canal Company to prolong to illimitable duration. The unfairness of such a proceeding, it was feared, would offer no insuperable objection to its adoption; and it might be easily contended, that the time consumed in the courts, no matter how, or by whom, would save the Canal Company from the operation of the limitation in its charter, or, at all events, from a ground for an application to the Legislature for an extension of the time allowed to complete the work.

"That the Canal Company entertained the views here expressed, there was not much reason to doubt: hence the pertinacity with which it insisted upon a compromise to Harper's Ferry only, rejecting the fair offer of an amicable adjustment of all existing difficulties, along the entire distance of collison; and hence, too, the rejection of a part of the fourth proposition.

"Under these circumstances, the Roilroad Company declined the compromise to Harper's Ferry, unless it was made the basis of a compromise and adjustment of differences to Cumberland, and determined that, as litigation was, at all events, insisted upon by the Canal Company, it should take place at the Point of Rocks, where, *if the Railroad Company was successful,* as it believed it would be, in defeating the claim to a right of prior choice set up by the Canal Company, *it would advance at once, upon the Potomac,* upon the property which it already held under conveyances from the owners in fee, *without the trouble* or *expense of suiting its location, and carrying on its construction, with reference to the convenience of the Canal Company,* as it would have to do were the compromise adopted. And if, contrary to all reasonable expectation, the Railroad Company should be defeated by such claim to prior choice, it would, *by stopping at the Point of Rocks, and then crossing into Virginia, be saved the expense of the construction, under the compromise, of a comparatively useless road,* and the *additional expense and difficulty of a viaduct over the more rapid and dangerous torrent of* Harper's Ferry. In a word, while the Canal Company had every thing to gain, and nothing to lose, by getting as far as Harper's Ferry only, the Railroad Company had nothing whatever to gain, and was certain of being subjected, under the most favorable circumstances, to expensive and ruinous delay by its opponent. The proposition of the Canal Company, therefore, to end the compromise at Harper's Ferry, and leave the remainder of the route to litigation, was, of necessity, rejected by this company as unfair and inequitable, and inconsistent with the duty which the President and Directors owed to the stockholders, whose interests were in their keeping.

"On behalf, and by direction of the directors.

"P. E. THOMAS,

"*President Baltimore and Ohio Railroad Company.*

"BALTIMORE, *January* 31, 1831."

The comment on the preceding views, thus frankly avowed by the Railroad Company, made by the general committee of the stockholders, in a report, approved by the general meeting to which it was addressed, could not fail to influence the subsequent judgment of the President and Directors of the Chesapeake and Ohio Canal Company. Part of it is here inserted, for that reason.

Extract from a Report of the General Committee of the Stockholders of the Chesapeake and Ohio Canal Company, dated

DECEMBER 3, 1831.

"From the foregoing, and other facts of equal notoriety, the committee believe that, whatever may be the legal rights of the parties, now referred to a judicial decision, it must, at least, be obvious that the Canal Company

has been harshly dealt with. This company was formed, and organized, and subscriptions made to its stock, for the purpose of carrying into execution a precise and well-defined object—to construct a canal upon ground which had been surveyed and located for that especial purpose; and after having ascertained, as nearly as possible, the expense to which the completion of it, as far as the Coal Banks, beyond Cumberland, would subject the parties.

"The Railroad Company, at the date of its charter, and at the period of its organization, seems to have had no definite plan of operations; but, holding out to the Legislature of the State and to the community, a vague project of a direct route from Baltimore to the Ohio, with a great advantage over the canal, both as to distance and expense, procured, upon the faith of these assurances, a charter of incorporation from the one, and a large subscription from the other. By the terms of the act of incorporation of the Canal Company, the necessary subscriptions were made, and the company incorporated, before the Railroad Company had indicated any intention or desire to appropriate, to its own purposes, the ground in controversy. A confident expectation was entertained, approaching almost to an absolute certainty, that the United States were about to subscribe a million of dollars to the work, which would insure an immediate commencement and vigorous prosecution of the enterprise. Before any public movement was made, threatening a collision, at that critical and interesting juncture, without having, themselves, made a single survey, with a view to ascertain its fitness for their purpose, but relying upon the accuracy of the surveys made exclusively for the canal; without having taken the necessary means to determine whether another and more eligible route was not open for their selection, a determination was made, but kept secret from the public, to abandon the project of a direct route to the Ohio, to surrender the magnificent promise of shortening the distance 140 miles, and to appropriate to their own exclusive use, the ground which had been located, and the tedious and expensive surveys which had been made, for the rival enterprise. The proceedings, in execution of this determination, were conducted with equal secrecy and despatch; and, should they be adjudged, finally, to have been operative to confer upon the Railroad Company the advantage which it has sought to acquire, we can have no cause for self-reproach, unless it be criminal not to indulge suspicions, which, had they proved groundless, might justly have been deemed most disparaging and offensive.

"Under the circumstances which have been detailed, the committee are of opinion that no censure could properly have attached to the body to which they belong, had its president and directors indignantly rejected all communications, of an amicable kind, with its opponent. But, though much was known, and more suspected, the full proof of all the foregoing facts has not been procured until recently, and that proof yet remains uncontradicted and without denial.

"Upon the subject of the compromise between the two companies, the committee, after all the investigation which they have given to it, entertain the decided opinion that no terms have been offered to the Canal Company, the acceptance of which would not have involved an expenditure of time and money, and the incurring of dangers nearly equivalent to total ruin. In this opinion, the committee have been confirmed by the statements made by Colonel Abert, Judge Roberts, and Mr. Cruger, upon whose judgment, in

matters of science and professional skill, we are disposed to place great confidence. The same investigation has induced the belief, on the part of the committee, that, in the conduct of this business, every spirit of accommodation has been exhibited by the canal board, which a due regard to the interests they represent would permit.

"The committee cannot close their remarks upon the subject of this unhappy and vexatious contest, without expressing their earnest desire and hope that it may be speedily and for ever terminated by a final judicial decision. Such a desire they believe to be universal on the part of those whom they represent; and they have been satisfactorily assured that, as soon as the evidence in the case was closed, an offer was made to the opposite party, through its counsel, to give to it, without argument or delay, the same decree which has been recently granted by the chancellor of Maryland. This offer was made for the purpose of avoiding unnecessary delay and useless expense, and was again renewed immediately before the last hearing of the case. The committee will forbear to assign any reasons for its rejection, which, however well grounded they may be, are, nevertheless, but conjectures.

"The repeated occasions on which the subject of this controversy has been brought before the public; the disingenuous statements which have been made in relation to it; the imposing manner in which these misrepresentations have been promulgated; and the misapprehensions as to its origin and character to which they have given birth and strength, have induced the committee, with unfeigned reluctance, to enter into the preceding detail. They have, however, endeavored faithfully to discharge a duty which they felt due to themselves, to the company of which they are members, and to the president and directors, to whom the management of interests so important are entrusted.

"'A compromise of the dispute between the two companies, as far as from the Point of Rocks to Harper's Ferry, was tendered in presence of a committee of the Senate, by the President of the Baltimore and Ohio Railroad Company, to the Presdent of the Canal Company. In a private interview between them, it was extended up the Potomac to 100 miles from Washington, at the town of Williamsport. It was accepted, to this extent, by the Canal Board, and confirmed by the President and Directors of the Railroad Company.

"'A survey and estimate was accordingly made, by engineers in the service of both companies, pursuant to this agreement; and a report by them, so far, favorable to the compromise, was submitted to the two boards. It was approved by that of the Canal Company; but, when it was expected by them to proceed to the execution of the joint work, the President and Directors of the Railroad Company coupled with their assent, besides other conditions wholly inadmissible, one entirely new—'that the Canal Company should agree to extend the compromise to the entire route between the Point of Rocks and Cumberland.'

"The letters from Messrs. Roberts and Cruger, (both of whom were well acquainted with the shores of the Potomac above the Point of Rocks,) which will be seen in a preceding part of this appendix, at the end of the third annual report of the President and Directors to the stockholders of the Chesapeake and Ohio Canal Company, will show why the former unanimously rejected the unexpected condition, attached by the President and Directors

of the Baltimore and Ohio Railroad Company, to a compromise proposed by their President, and subsequently approved by themselves.

"Signed in behalf of the committee.

RICHARD S. COXE, *Chairman.*"

It is to be regretted that, in the last annual report of the Baltimore and Ohio Railroad Company, no notice is taken, except in the appendix, of the concession, by the Canal Company, of the liberty of passing over the canal and river with their road, at the Point of Rocks.

A still greater regret must be felt by the friends of the Canal and Railroad Companies, at the effort which is making to excite renewed hostility between them; and, especially, to prejudice the General Assembly of Maryland against the former, on account of the final rejection of the proposal of the latter for a joint construction of the two works, along the narrow passes between the first point of interference and Harper's Ferry. "A change of the location of the canal between those points, as originally laid down," with a view to shut out the railroad, has not only been imputed to the Canal Company, but it has been, moreover, asserted, very gravely, that this change of location was made, "in defiance of the known and expressed wishes of the State of Maryland."

The dates of these transactions, and the facts connected with them, refute these allegations.

Extracts from the Journal of the proceedings of the President and Directors of the Chesapeake and Ohio Canal Company.

The President and Directors of the Chesapeake and Ohio Canal Company.

IN MEETING, *January* 7, 1832.

Resolved, That public notice be given that the portion of the Chesapeake and Ohio canal between the western termination of the 84th section, and the dam next below Harper's Ferry, will be let in convenient sections, at Harper's Ferry, on the 23d day of February next, and that proposals will be received for the same till the 17th day of February, at the office of the Canal Company in the city of Washington.

IN MEETING, *January* 14, 1832.

Resolved, That authority be given to the President of the company to contract, without delay, for the construction of the canal to a distance of two miles above its present termination near the Point of Rocks.

Resolved, That the resident engineer be directed to have as much of the canal ready to be let on the 23d of February, as will extend it to the head of the falls next above Harper's Ferry.

February 4, 1832.

The President reported to the board the contracts made by him for sections 85, 86, 87, 88, and 89, under the order of the board, of the 14th January last.

Extracts from the journal of proceedings.

Attest: JOHN P. INGLE,

Clerk Ches. and Ohio Canal Co.

Contracts for sections Nos. 85, 86, and 87, (passing the lower Point of Rocks) were *executed* on the 21st day of February; and for sections Nos. 88 and 89, (passing the upper Point of Rocks) on the 30th day of January. Those for sections Nos. 90 to 112, (extending from the upper Point of Rocks to the head of Harper's Ferry falls) were declared on the 14th March, and *executed* at various dates since that period.

JOHN P. INGLE,
Clerk Ches. and Ohio Canal Co.

The first proposition of the Baltimore and Ohio Railroad Company bears date, Baltimore the 19th of January, 1832, five days after the authority given to the President of the Canal Company to let out, to two contractors who had completed their works below, and had a large force at command, the five sections, or 2½ miles, immediately at and above the Point of Rocks. It was submitted to the Directors, at the meeting next ensuing the date of its reception at Washington, and the following are the proceedings on it:

Extracts from the Journal of proceedings of the President and Directors of the Chesapeake and Ohio Canal Company.

The President and Directors of the Chesapeake and Ohio Canal Company.

In Meeting, *January* 28, 1832.

The President of the company submitted to the board the following communication, under date of the 19th January, from the President of the Baltimore and Ohio Railroad Company, covering certain resolutions of the President and Directors of that company.

Office of the Baltimore and Ohio
Railroad Company, *January* 19, 1832.

Gentlemen: I have been requested by the directors of this company to communicate with you on the subject of the within resolutions, and I cannot better express the wishes of the board, than by calling your attention to the resolutions themselves.

The legal controversy which has heretofore existed, having been decided against this company, it becomes necessary for it to select another route, for the further construction of the work in which it is engaged; and it entertains no doubt that the causes of collision which have heretofore existed, being now removed, the subject of the present communication will receive the early and favorable attention of the Canal Company.

I am, respectfully, &c. &c.

P. E. THOMAS,
President Baltimore and Ohio Railroad Company.

To the President and Directors
Of the Chesapeake and Ohio Canal Company.

"At a meeting of the President and Directors of the Baltimore and Ohio Railroad Company, on the 19th of January, 1832, it was, on motion,

"*Resolved*, That the President of this company be requested to communicate with the Chesapeake and Ohio Canal Company, for the purpose of ascertaining from them whether any arrangement can be made, by which

the railroad may be conducted, jointly with the canal, as far as to Harper's Ferry, on the north bank of the Potomac, with the view of crossing into Virginia at that place; and, also, to arrange with the Canal Company such plan as will be mutually satisfactory for the passage of the railroad across the canal, either at Harper's Ferry, or at the Point of Rocks, should this last place be selected for crossing the Potomac with the road.

"*Resolved*, That the President be authorized to propose, as the basis of the arrangement by which the railroad may be constructed, jointly with the canal, on the north bank of the Potomac river, as far as Harper's Ferry, the surveys heretofore made by Messrs. Roberts and Knight, and filed in the Chancery Court of Maryland; and that he also be authorized to propose that the whole of the additional expense incurred by the Canal Company, in consequence of such joint construction, be borne by the Railroad Company.

Extracted from the minutes,

JOHN N. BROWN, *Recording Secretary.*

OFFICE OF THE BALTIMORE AND OHIO RAILROAD COMPANY."

The letter and resolutions having been read, it was

Resolved, That the same be referred to a committee of three members, to consult with the resident engineers of the company, and to consider and report thereon with the least possible delay; and that the committee consist of John J. Abert, Walter Smith, and Phineas Janney.

Resolved, That the President of this company advise the President and Directors of the Baltimore and Ohio Railroad Company, that the President and Directors of this company have received, and referred, together with the letter of their President, their resolutions of the 19th inst. to a committee of this board, with instructions to consult with the resident engineers of the company, and to consider and report thereon as soon as practicable.

IN MEETING, *March* 10, 1832.

Col. John J. Abert, from the committee appointed on the 28th January last, made the following report, which was read, and the consideration thereof postponed until Wednesday next.

The undersigned, a committee to which was referred a communication from the President of the Baltimore and Ohio Railroad Company, enclosing two resolutions of the President and Directors of that company, in the following words:

"*Resolved*, That the President and Directors of this company be requested to communicate with the Chesapeake and Ohio Canal Company, for the purpose of ascertaining from them whether any arrangement can be made, by which the railroad may be conducted, jointly with the canal, as far as to Harper's Ferry, on the north bank of the Potomac, with the view of crossing into Virginia at that place; and to arrange with the Canal Company such plan as may he mutually satisfactory, for the passage of the railroad across the canal, either at Harper's Ferry, or at the Point of Rocks, should this last place be selected for crossing the Potomac with the road.

"*Resolved*, That the President be authorized to propose, as the basis of the arrangement by which the railroad may be conducted, jointly with the canal, on the north bank of the Potomac river, as far as Harper's Ferry, the surveys heretofore made by Messrs. Roberts and Knight, and filed in the

Chancery Court of Maryland; and that he be also authorized to propose that the whole additional expense incurred by the Canal Company, in consequence of such joint construction, be borne by the Railroad Company."

Respectfully report:

That these resolutions properly divide themselves into two distinct propositions:

1st. The joint construction of the railroad and canal, on the north bank of the Potomac, from the Point of Rocks to Harper's Ferry, and for the railroad to cross the river at the latter place; and,

2d. To conduct the railroad across the canal and the river, to the opposite shore of the Potomac, near the Point of Rocks.

After bestowing upon the propositions all the consideration due to their intrinsic importance, as well as to the highly respectable company by which they are made, the committee have come to the conclusion that this board ought not to agree to the first proposition.

To the second proposition, the committee see no sufficient objection, provided the crossing can be effected in a manner not to injure the canal, nor to impede its free use, nor to hazard its preservation by the abutments and piers in the river, which the railroad may require: but it is the opinion of the committee that the place of crossing should be below the "Point of Rocks."

To prevent any misunderstanding on this subject, the committee recommend that the manner and conditions of crossing the canal and the river, with the railroad, should be expressed in a written agreement; and, also, that the same agreement should provide for the manner of crossing with the railroad over the tributary streams of the Potomac.

The committee, according to the instructions of the board, consulted the resident engineers of the company on the local circumstances connected with the subject-matter of the resolutions of the President and Directors of the Railroad Company, and their opinion, as expressed in the annexed report, is decidedly against the joint construction of the two works. These engineers, being actively engaged upon a distant part of the canal line, their report was not received until within a few days past; which circumstance is stated as an apology for the delay in making this report.

J. J. ABERT,
W. SMITH,
PHINEAS JANNEY, } *Committee.*

March 10, 1832.

Report of the Resident Engineers of the Chesapeake and Ohio Canal Company, to a Committee of the Board, on the joint construction of the Canal and Railroad.

HARPER'S FERRY, *February* 20, 1832.

GENTLEMEN: In conformity with your request, we herein present our views on the effects likely to be produced upon the canal, in the event of a conjoint construction with the Baltimore and Ohio railroad, from the "Point of Rocks" to Harper's Ferry; and, also, if a viaduct were constructed across the canal and the Potomac, below the "Point of Rocks," and the railroad conducted to and up the southern bank of the Potomac.

1st. In order to permit the construction of the railroad, conjointly with the canal, it will be necessary to construct the canal further into the Potomac, at all the difficult passes, than if it were made separately. This will increase the amount of walling and embankment, and, by forcing the bank of the canal into the deep and rapid water of the Potomac, much increase the hazard from without, whilst it will be more difficult to render the canal secure from breaches within its banks, the cost must necessarily be augmented; and, from the difference that occurs between the prices at which the work has lately been contracted, and those of the commissioners under the decree of the Chancellor of Maryland, it will much exceed their estimate of the difference of cost between an independent and conjoint construction of the canal. We have satisfied ourselves of the accuracy of this statement by having examined the subject, and made the comparisons, based upon the quantities in their report.

2d. Having disposed of this first proposition, we will now proceed to consider the application for permission to cross the canal at the Point of Rocks to the Virginia shore.

We do not perceive that, by the construction of a viaduct across the Potomac at the Point of Rocks, any injury could result to the works of the canal, from the damming up of either the water or ice, provided a sufficient elevation be maintained. The necessity of providing ample space above the surface of water in the canal, for boats of the most elevated description contemplated to be used upon it, will insure the viaduct an altitude that will effectually prevent the possibility of any injury from the accumulation of of ice between its piers.

The height we would recommend, is, that the under side of the arch be at least eighteen feet above the surface of the water in the canal, and that the canal and banks be included in one arch, or span of eighty feet. We are also of opinion that the arches of the viaduct to be constructed across the Potomac, should not be less than one hundred and twenty feet span, and of the same elevation as that across the canal.

We have thus briefly given our views on the questions submitted to us, confining ourselves entirely to the consideration of the effects the execution of either plan would probably produce upon the works of the canal.

ALFRED CRUGER,
THOMAS F. PURCELL.

To Messrs. J. J. Abert, W. Smith, P. Janney,
Committee on the Railroad proposition.

In Meeting, *March* 14, 1832.

The board took up for consideration the report of the committee submitted at the last meeting, on the communication of the Baltimore and Ohio Railroad Company of the 19th January last. The report was approved and adopted; and it was

Resolved, That a copy of said report, together with a copy of the proceedings of this board thereon, be transmitted, by the President, to the President and Directors of the Baltimore and Ohio Railroad Company.

True extracts from the Journal.

Test: JOHN P. INGLE, *Clerk C. & O. C. C.*

The resolution of the General Assembly of Maryland, requesting the President and Directors of the Chesapeake and Ohio Canal Company to submit to a general meeting of the company the railroad proposal, which they had already rejected, though probably without the knowledge of the General Assembly, was adopted on the 14th of March; the same day, it is believed, on which it was introduced into that body. It was *accidentally* communicated, by a Representative in Congress, to the President of the company, from a Baltimore newspaper, and by him submitted, in this form, on the 17th of March, three days after its passage, to a Board of Directors, whose proceedings upon it were as follows:

The President and Directors of the Chesapeake and Ohio Canal Company.

IN MEETING, *March* 17, 1832.

The President informed the board that the General Assembly of Maryland had, on the 14th instant, passed a resolution recommending to the President and Directors of the Chesapeake and Ohio Canal Company to call a public meeting of the stockholders of the said company, and submit to their consideration the proposition of the Baltimore and Ohio Railroad Company, for the joint construction of the canal and railroad from the Point of Rocks to Harper's Ferry. It was, therefore, unanimously

Resolved, That a special general meeting of the stockholders of the Chesapeake and Ohio Canal Campany, be convened in the City Hall, in the city of Washington, on Satarday, the 28th day of April next, at 10 o'clock, A. M. for the purpose set forth in the aforesaid resolution of the General Assembly of Maryland.

IN MEETING, *April* 28, 1832.

This being the day for the meeting of the stockholders of the company, according to notice given, under the order of the board of 17th March ult., the President presented the following report; which, after being read, was approved, and the President was requested to sign and present the same to the stockholders, in behalf of the board.

REPORT.

The President and Directors of the Chesapeake and Ohio Canal Company, in compliance with a resolution of the General Assembly of Maryland, have called a meeting of the stockholders of the company, and have now the honor to submit to them, along with a copy of the resolution, the prior correspondence and orders of the board in relation to the topic which it embraces.

True extract from the Journal.

Teste: JOHN P. INGLE, *Clerk C. & O. C. C.*

The stockholders accordingly met, and here follow their proceedings.

Proceedings of the Stockholders of the Chesapeake and Ohio Canal Company.

SATURDAY, *April* 28, 1832.

A special meeting of the stockholders of the Chesapeake and Ohio Canal Company was this day held in pursuance of a call by the President and Directors of the company.

General John P. Van Ness, mayor of Washington, was appointed chairman of the meeting, and John P. Ingle secretary.

Many individual stockholders, or their proxies, attended the meeting; besides which, the following stock was represented, as stated, constituting, altogether, a very large majority of the stock of the company.

The United States, by the honorable Secretary of the Treasury.

The State of Maryland, by B. S. Forrest, esq.

The State of Virginia, by J. L. Ranson, esq.

The Corporation of Washington, by the Mayor, and Peter Force, George Watterston, Johnson Hellen, and Jacob Gideon, jr., esquires.

The Corporation of Georgetown, by the Mayor, and Samuel McKenney, and Thomas Corcoran, esquires.

The Corporation of Alexandria, by Bernard Hoe, Thomson F. Mason, and A. C. Cazenove, esquires.

The Corporation of Shephardstown, by Doctor Henry Boteler.

The President of the company presented the following report of the President and Directors, which, together with the documents therein referred to, were read.

REPORT.

The President and Directors of the Chesapeake and Ohio Canal Company, in compliance with a resolution of the General Assembly of Maryland, have called a meeting of the stockholders, and have now the honor to submit to them, along with a copy of the resolution, the prior correspondence and orders of the board in relation to the topic which it embraces.

Signed in behalf of the President and Directors.

C. F. MERCER, *President.*

Benjamin S. Forrest, esq., then laid before the meeting a copy of the following preamble and resolution adopted by the General Assembly of Maryland.

Whereas, the progress, on the route selected, of the Baltimore and Ohio Railroad Company, one of the great works of internal improvement, in the success of which the State of Maryland is deeply interested, has been suspended at the Point of Rocks, on the left bank of the Potomac river, by a decision of the Court of Appeals of this State, in favor of the claim of the Chesapeake and Ohio Canal Company to the prior right of choice for the route and site of their canal along the Potomac, which right of choice the said Canal Company have executed by choosing, for the route and site of the canal, the said left bank of the river.

And, whereas, the chief engineer of each of the said companies, acting as commissioners, under the direction of the court of chancery, and at the mutual request of the said companies, after making the necessary examinations, surveys, and estimates, united in opinion, and reported that it was practicable to construct both the contemplated works through the narrow passes, from a point below, but near the Point of Rocks, to a point at the bridge which crosses the Potomac at Harper's Ferry, by a reasonable increase of expense.

And, whereas, it is represented to this General Assembly that the Baltimore and Ohio Railroad Company are willing to bear and pay the additional expense, which will be incurred by the joint construction of the said canal and railroad from the Point of Rocks to Harper's Ferry, comformably to the said report; and the interest of the State and the public benefit will be greatly promoted by the extension of the said railroad past the Point of Rocks to the bridge at Harper's Ferry: therefore,

Resolved, by the General Assembly of Maryland, That it be earnestly recommended to the President and Directors of the Chesapeake and Ohio Canal Company to call a public meeting of the stockholders of the said company, in the manner authorized by the charter, and submit, to their consideration, the proposition of the Baltimore and Ohio Railroad Company, for the joint construction of the canal and railroad, aforesaid, from the Point of Rocks to Harper's Ferry. And that the agent or person appointed to represent and vote, on behalf of the State of Maryland, at meetings of the stockholders of the said Canal Company, be, and he is hereby, authorized to attend at the said meeting, and explain the wish and opinion of this Legislature, that such joint location should be assented to by the Chesapeake and Ohio Canal Company; and that the said agent use his best endeavors to obtain such assent, and to have the object of this resolution effected on just and reasonable terms.

We hereby certify, that the aforegoing is a true copy of the original preamble and resolution which passed the General Assembly of Maryland at December session, 1831.

Given under our hands, this fifteenth day of March, in the year of our eighteen hundred and thirty-two.

JOS. H. NICHOLSON,
Clerk of the Senate of Maryland.
GEORGE G. BREWER,
Clerk House Delegates of Maryland.

The preamble and resolution having been read, it was, on motion of Benjamin S. Forrest, esquire,

Resolved, That the report of the President and Directors of the Chesapeake and Ohio Canal Company, with the accompanying documents, the resolution of the General Assembly of Maryland, passed at its last seasion, relative to the joint progress or location of the Baltimore and Ohio railroad and the Chesapeake and Ohio canal, and the proposition of the Baltimore and Ohio Railroad Company, made to the President and Directors of the Chesapeake and Ohio Canal Company on the 19th January, 1832, be referred to a committee to consist of five stockholders or representatives of stock, who may report on the propriety of yielding to the recommendations of the General Assembly, and assenting to the said propositions, or any part thereof, at the general meeting of the stockholders to be holden on Monday the 4th day of June next.

Ordered, That the chairman appoint the committee.

The chairman then appointed Richard S. Coxe, esq., General John Mason, Colonel George Bomford, Doctor Henry Boteler, and Thomson F. Mason, esquire, to be the committee.

The meeting then adjourned sine die.

JOHN P. VAN NESS, *Chairman.*

JOHN P. INGLE, *Secretary.*

NOTE—Colonel George Bomford was subsequently excused from serving on this committee, and Joseph Pearson, esquire, was appointed to supply his place.

Extracts from the Journal of Proceedings of the Stockholders of the Chesapeake and Ohio Canal Company.

The Stockholders of the Chesapeake and Ohio Canal Company.

In General Meeting, *Saturday, June* 16, 1832.

Richard S. Coxe, esquire, from the committee appointed on the 28th April last, and to whom was referred the resolution of the General Assembly of Maryland, relative to the joint construction of the Chesapeake and Ohio Canal, and the Baltimore and Ohio Railroad, from the Point of Rocks to Harper's Ferry, made the following report; which, after being read, was ordered to lie on the table and be printed.

The committee appointed at a meeting of the Stockholders of the Chesapeake and Ohio Canal Company, under a resolution passed on the 28th April, 1832, beg leave respectfully to report:

That your committee was directed to take into consideration a resolution passed by the General Assembly of Maryland, recommending to the President and Directors of the Chesapeake and Ohio Canal Company to call a public meeting of the stockholders of said company, and submit to their consideration the proposition of the Baltimore and Ohio Railroad Campany, for the joint construction of the canal and railroad, aforesaid, from the Point of Rocks to Harper's Ferry. The various papers connected with this subject were likewise referred to the committee, and have received its deliberate and full consideration.

A reference having been made in the resolution of the General Assembly of Maryland, to the gentleman who was to represent the stock of that State, for a more full exposition of the wishes and opinions of the Legislature of that State upon this interesting and important subject, the committee indulged the hope that, by reference to that gentleman, some precise and definite *projet* of an arrangement might be obtained which could be discussed in its details, and terminated in a manner satisfactory to the Legislature from which the proposition emanated. The language of the resolution expressed the hope that the object of it might be effected upon just and reasonable terms. It would have been desirable, could the committee have ascertained what arrangement would have been satisfactory, and what terms would be deemed just and reasonable.

The terms of the proposition to which the attention of the committee has been directed, are embodied in a resolution of the Railroad Company, under date of the 19th January, which will be found annexed to this report. It may be important to bring before the recollection of the stockholders the details of this proposition. The President of the Railroad Company was requested to communicate with the Chesapeake and Ohio Canal Company, for the purpose of ascertaining from them whether any arrangement can be made, by which the railroad may be constructed, jointly with the canal, as far as Harper's Ferry, on the north bank of the Potomac, with the view of crossing into Virginia at that place; and, also, to arrange with the Canal Company such plan as will be mutually satisfactory, for crossing into Virginia at that place; and, also, to arrange with the Canal Company such plan as will be mutually satisfactory, for the passage of the railroad across the canal, either at Harper's Ferry, or at the Point of Rocks, should this last place be selected for crossing the Potomac with the road.

It was further resolved, that the president be authorized to propose, as the basis of the arrangement by which the railroad may be constructed, jointly with the canal, on the north side of the Potomac river as far as Harper's Ferry, the surveys heretofore made by Messrs. Roberts and Knight; and that he be authorized to propose that the whole of the additional expense incurred by the Canal Company, in consequence of such joint construction, be borne by the Railroad Company.

On the receipt of this communication by the Canal Company, it was referred to a committee of three, which consisted of Messrs. John J. Abert, Walter Smith, and Phineas Janney. The committee, after bestowing upon the subject their full consideration, on the 10th March, 1832, submitted their views, in the form of a report, in which they observe "that these resolutions divide themselves into two distinct propositions: 1st. The joint construction of the railroad and canal, on the north bank of the Potomac, from the Point of Rocks to Harper's Ferry, and for the railroad to cross the same at the latter place. And 2d. To conduct the railroad across the canal and river, to the opposite shore of the Potomac, near the Point of Rocks."

After bestowing upon the propositions all the consideration due to their intrinsic importance, as well as to the highly respectable company by which they are made, the committee have come to the conclusion that the board ought not to agree to the first proposition.

To the second proposition "the committee see no sufficient objection, provided the crossing can be effected in a manner not to injure the canal, nor to impede its free use, nor to hazard its preservation by the abutments and piers in the river, which the railroad may require; but it is the opinion of the committee that the place of crossing be below the Point of Rocks."

Appended to the report of the committee. will be found the opinion of the resident engineers of the Canal Company, who were consulted upon the subject, and whose views fully sustain those of the committee.

This report was submitted and adopted at a meeting of the board on the 14th March, and the President was instructed to communicate the result to the President and Directors of the Railroad Company; which communication was made by letter, under date of the 16th March.

It will be observed that the resolution of the General Assembly transmitted to this committee by the representative of the State of Maryland, is certified on the 15th of March, and probably received its final passage on the 14th. This comparison of dates leaves no doubt upon the mind of the committee that the Legislature, when it adopted the resolution in question, could not have known of the action of the canal board upon the subject under consideration, and consequently could not have contemplated an appeal to the general meeting of the stockholders, for the purpose of procuring the reversal of an unfavorable decision by the President and Directors.

The proposal made by the Railroad Company, under date of the 7th June, appears to the committee to vary from that communicated to the canal board n January, only in the circumstance that it is more full and precise in its details. Each assumes as its basis the surveys, levels, plans, estimates, and report of Messrs. Knight and Roberts, made in the year 1830. Each contemplates the contemporaneous construction of both works, under joint contracts and superintendence. Each proposes that the Railroad Company should

encounter the entire additional expense which would be consequent upon the adoption of this course.

In the examination which the committee have been enabled to give to the question, it at once occurred to them that the proposal no longer retained its original character of a compromise of doubtful, or, at least, controverted rights, in which a prudent regard to present interests, and prospective advantages, might justify, and even require, important sacrifices. During the protracted period which intervened between the institution of the suits between the two companies, and their recent termination, an anxious desire to avoid delay in these great projects of internal improvement, and the disastrous consequences which threatened to involve both in ruin, appeared to require that these grounds of controversy should be removed, even at the expense of great increased expense in the construction of the work of the canal, additional danger after the construction was completed, and inconveniences which might result from too close a contiguity between the rival enterprises. Under these circumstances, a proposal was made to the Railroad Company to arrange, by way of compromise, the grounds of controversy which subsisted between the Point of Rocks and Harper's Ferry. Neither the Canal Company, nor its officers, overlooked, or undervalued the sacrifices which such an adjustment would necessarily involve; but, in their judgment, circumstances required they should be made, the proposition then tendered was rejected; and, probably, a careful review of the subject will justify the belief that the rejection was a wise and judicious determination.

Whether or not the one company erred in making the offer, or the other in declining to accede to it, is not so material to inquire. It is obvious that the attitude of the parties, and the character of the question, is now essentially changed. Rights which were then litigated, have been judiciously settled; the delay which it was so expedient to avoid has been suffered; the expense of the controversy has been encountered, and many of the evils which were anticipated have been endured. The proposal is not now to relinquish doubtful claims, but to surrender legal rights; not to avoid delay, but voluntarily to encounter it; not to adjust controversies already pending, but to sow the seeds for an abundant harvest of future litigation. If these views be correct, and the committee will briefly submit their reasons for so believing, it can scarcely admit of a doubt, that the President and Directors acted wisely and faithfully in declining the overture made in January last.

The right of the Canal Company to the selection of a site for their operations, has now been judicially and finally settled. That this right has not been exercised wantonly, or in any disposition to injure or retard the rival enterprise, must be apparent from the fact, that the location which has been adopted, rarely, and to a small extent only, varies from the position which had been originally selected, before any apprehensions existed of a collision with any competitor. Wherever these variations have occurred, they have been demanded by a due regard to the interests of the Canal Company; they were made without the slightest reference to an interference with any other party; and they do not exceed in amount those deviations from every original plan of construction when it is required to be reduced to practical operation.

The contracts for the sections at the lower Point of Rocks were made under authority of an order of the board, of the 14th January, some days anterior to the date of the resolution of the Railroad Company; and definitive arrangements were at the same time made to place the entire line to the falls above Harper's Ferry under contract.

The original location of the canal, in some few instances, carried its outward embankment further into the bed of the river than ever was deemed advisable. The object of this location was to avoid the expense and labor of excavating the precipitous rocks which impinged upon the river. The selection was to be made between two difficulties, and the determination of the question involved considerations of present expense and future security. In some few instances, a more precise examination of the ground, with a view to the actual construction of the work, has induced the few alterations to which reference has been made. The experience of the company, as well as the skill of its engineers, combine to confirm the propriety of these changes.

But the proposition now under consideration, to permit the conjoint construction of the two works, agreeably to the plans and surveys made by Messrs. Knight and Roberts, in 1830, would necessarily involve, not only a departure from the route now recommended on every principle of expediency, but increase the evils and augment the dangers sought to be avoided, to an enormous extent. The reports of those engineers clearly showed that this conjoint location was feasible; but no opinion was required of them, in their capacity as commissioners, as to the expediency of such a measure; nor were they called upon to detail the advantages, or disadvantages, which would result from the operation.

In the course of the legal controversy recently terminated, it was judged expedient by the counsel of the Canal Company to examine witnesses upon this subject, and the opinions of Judge Roberts, one of the commissioners, of Colonel Abert, not at that period in any manner connected with either company, but who had personally, in the service of the Government, examined and surveyed the whole ground, from Cumberland to the points under consideration, and of Mr. Cruger, who had for some time been in the employ of the company as engineer, were taken upon oath, as witnesses. Their testimony concurred in representing this conjoint location to be, upon scientific principles, wholly disconnected with any views of policy, hazardous in the extreme to the canal.

In the soundness of this judgment, it certainly does not become this committee to entertain any want of confidence, and they should feel that they were not doing justice to themselves, nor to those whose interests they have been called to represent, if they did not express their own concurrence in these opinions, strengthened and confirmed in the minds of a majority of the members of the committee, by a personal and careful examination of the ground. They would beg leave to append to this report the substance of the testimony upon this point to which they have adverted.

It might well be doubted whether the Canal Company, holding in its hands not only the interests of the individual stockholders, but being, as your committee consider, trustees of the public for great national objects, can lawfully surrender any of its franchises to any other body, upon any consideration. The selection of the route for their operation should be made purely and exclusively upon scientific principles; and when those in the employ of the company, upon whose scientific acquirements they are bound to rely, and in whose judgment they repose entire confidence, have selected the route which the best interests of the company require to be pursued, it would be unwise and objectionable, in every point of view, to deviate from this plan upon any grounds of policy, or with reference to other interests

than those of the company itself. With every desire to promote the views of the Legislature of Maryland, and other great interests involved in the railroad, your committee entertain the most serious doubts as to the legal competency of this company to subserve them by a surrender of any of its powers, or by abstaining from the discharge of any of its duties.

On this subject of the delay which would result from the adoption of the plan recommended, the opinion of your committee is not less explicit. From the nature of the ground, and the plan of the canal which was originally recommended and not yet deviated from, the works have been, for a considerable length of time, completed, and in full operation, as high up as the mouth of Seneca creek, a distance of twenty-two miles. The excavation, embankments, and other works, have been, for the most part, finished from that position to the Point of Rocks, and will, ere long, be entirely completed. But this important section of the canal cannot be made available, until, by its extension, as high as the contemplated dam, in the vicinity of Harper's Ferry, a competent supply of water may be obtained. The effect of the past controversy with the Railroad Company has consequently been to deprive this company of the use of all that portion of their works lying above the mouth of Seneca; and they must continue to be equally available, until a sufficient feeder and free communication can be completed from the point above.

In the mean time, the railroad, unembarrassed with any such impediments, has been advancing until it has met the Potomac, near the Point of Rocks; and, so far as it has completed its works, has been able to bring them into full operation. The consequence has been, that, while that company is in the full enjoyment of about sixty miles of road, this company is unable to employ one half of its works, because of the impediments which have arrested our progress at the Point of Rocks.

In the judgment of your committee, therefore, nothing could be more unwise and inexpedient than to surrender the power now possessed, of carrying on our operations to the Harper's Ferry feeder, without interruption or molestation, so as to bring into active use not only the distance which intervenes between the Point of Rocks and Harper's Ferry, but all that expensive and valuable part of the canal extending downward to the mouth of Seneca, a distance of twenty-six miles.

That this most desirable end can be accomplished only by pursuing our own course, unfettered and unrestricted, appears to the committee perfectly demonstrable. The whole line of the canal, over this debatable ground, is now under contract, and the energies of the company are directed to its speedy and effectual completion. To attempt, at this moment, to substitute a joint construction of the two works, upon the plan proposed, would require an abandonment of that which has been done; would demand a considerable loss of time to arrange and digest, with the necessary precision, the details of a compact between the two companies, the re-letting the entire line under new contracts, which are to be approved of by both companies before the execution of them can be commenced.

It would be an affectation to attempt to disguise the consequences which, in the estimation of your committee, would result from an attempt to carry on such a system of conjoint operation. Whatever might be the disposition of the two companies themselves; however they might feel inclined, not only to harmonize in their views, but even to promote the great objects of mutual interest, it is impossible to doubt but that indiscretions and improper feelings, even among the subordinate agents of either party, might in-

volve the most serious consequences to both companies. Neither company could, consistently with its own views, or perhaps within the powers conferred upon it by its charter, submit its concerns, and those in its employ, to the superintending control of the other; and, without some one common umpire to settle and adjust all controversies which may arise, it would be vain to anticipate any thing else than constant interruptions to that harmonious feeling which could alone, under the most favorable circumstances, ensure the objects which both ought to have in view.

The foregoing suggestions appear to your committee conclusive upon this branch of the subject: but other considerations press strongly upon their minds with irrisistible force. The views which have already been presented must satisfy any individual of the great importance of urging, with all practicable diligence, the extension of the canal up to the feeder at Harper's Ferry. The sparse population of the neighborhood, the peculiar disadvantages of its climate, and the competition for labor, growing out of various causes, conspire to render this more difficult than can easily be imagined. It would be nearly impracticable to obtain the requisite quantity of operatives to ensure a speedy execution of both works, while the competition would necessarily greatly enhance the price of labor, and be seriously injurious to the interests as well as of the contractors as of the companies.

The considerations which have been urged, with many others, upon which time is not allowed to dilate, have brought the committee, unanimously, to the conclusion, that the proposition made by the Railroad Company cannot be entertained. They are, also, with equal unanimity, of opinion that the President and Board of Directors acted wisely and faithfully, in promptly and decisively declining to accede to it when originally made, and in taking measures to put under contract, and urge to a speedy conclusion, the important section of the work which was embraced by the subject under consideration.

If any doubts had existed in the minds of the committee that the course pursued by the President and Directors was not only judicious in itself, but that it could not, by any construction, be supposed to have been influenced by the position which the two companies occupied in relation to each other, or that it could have been deemed injurious to the rights, or even the interests, of the Railroad Company, these doubts would have been removed by reference to the language held by that company in one of the recent reports from its board to the Legislature of Maryland. A single passage from that report, dated 31st of January, 1831, will fully illustrate this idea. In adverting to the unsuccessful attempt to compromise the conflicting claims of the two companies, the report in question represents to the Legislature that, "under these circumstances, the Railroad Company declined the compromise to Harper's Ferry, unless it was made the basis of a compromise and adjustment of differences to Cumberland, and determined that, as litigation was, at all events, insisted upon by the Canal Company, it should take place at the Point of Rocks; where, if the Railroad Company was successful, as it believed it would be, in defeating the claim to a right of prior choice, set up by the Canal Company, *it would advance at once upon the Potomac,* upon the property which it already held under conveyances from the owners in fee, *without the trouble or expense of limiting its location, and carrying on its construction with reference to the convenience of the Canal Com-*

pany, as it would have to do were the compromise adopted. And if, contrary to all reasonable expectations, the Railroad Company should be defeated by such claim to prior choice, *it would, by stopping at the Point of Rocks, and then crossing into Virginia, be saved the expense of the construction under the compromise of* A COMPARATIVELY USELESS ROAD, and the additional expense and difficulty of a viaduct over the more rapid and dangerous torrent of Harper's Ferry. In a word, while the Canal Company had every thing to gain and nothing to lose, by getting as far as Harper's Ferry only, the Railroad Company had nothing whatever to gain, and was certain of being subjected, under the most favorable circumstances, to expensive and ruinous delay by its opponent."

If the canal board have been in error in supposing this language sincere, and as indicating, on the part of the Railroad Company, a positive determination to use the victory, if they obtained it, for the exclusive purpose of promoting their own separate interests, and as equally expressing their judgment that the conjoint construction of the two works, over the debatable ground, be prejudicial to the interests of that company, to an extent far greater that that of crossing the Potomac at the Point of Rocks, this committee, after mature consideration, in giving to it the same interpretation, have concurred in the misapprehension.

The committee has felt that, in performing the duty devolved upon it, and in submitting this brief exposition of the views by which they have been guided, to the consideration of the stockholders, other and higher motives were to influence the deliberations of this company, than such as originated in, or were nourished and sustained by, the recollection of controversies formerly subsisting between the two companies, and now so happily adjusted. The committee has perceived that deep and important interests were involved in both enterprises, and they viewed with peculiar solicitude those of the State of Maryland, which are intimately connected with the prosperity of both institutions. We believe it to be incumbent upon us to respect and to promote the object which that State had deeply at heart, by every means which do not require the surrender, to a corresponding degree, of the interests of the Canal Company. Such a surrender could assuredly never have been contemplated nor desired by the Legislature of Maryland; and the gentleman who framed and submitted to its consideration the resolution which has formed the basis of the present proceedings, has publicly and explicitly expressed his belief that "the Canal Comgany would [not] be so suicidal as to injure itself in order to benefit the railroad."

In laboring to ascertain whether any irreconcilable contrariety of interest existed between this company and the wishes expressed by the Legislature of Maryland, the committee, after the fullest consideration, have arrived at the conclusion, in their own minds, that they are not essentially and vitally hostile. Entertaining undiminished confidence in their own undertaking, they cannot believe that the vicinity of a railroad to the canal, provided the works of the one will not impede the free use of the other, or an uninterrupted access to and from the adjacent country, will be seriously detrimental to the interests of the latter. We believe that the canal may successfully compete upon equal grounds with its enterprising rival. Under this firm conviction, and anxious desire to meet the views of those who anticipate great advantages from the completion or extension of the railroad, your committee would suggest to the consideration of the stockholders, that if, upon a

more minute survey and examination of the ground, it shall appear that an arrangement can be effected, upon satisfactory terms, which shall protect the canal from danger to its works, their unobstructed use, and an easy and uninterrupted access to the adjacent country, wherever it may be deemed expedient, that, as soon as the canal is completed to Harper's Ferry, upon its own independent location, every facility be extended to the Railroad Company to continue their work to the same point. And should it be finally decided by that company that Harper's Ferry furnishes a more eligible position, at which to cross the canal and river to the Virginia shore, that the Canal Company should consent to any liberal and fair arrangement by which that object can be attained, without sacrificing the paramount interests of the canal.

RICHARD S. COXE, *Chairman.*

June 16, 1832.

IN MEETING, WEDNESDAY, *July* 11, 1832.

A motion was made by Benjamin S. Forrest, esq., that the meeting should now adjourn until the 25th day of the present month, but the motion was lost.

On motion by Joseph Pearson, esquire, the report of the committee on the resolution of the General Assembly of Maryland, relative to the joint construction of the canal and railroad, was taken up for consideration. The report having been read, was, on motion of General Walter Jones, laid upon the table.

On motion by General Walter Jones, it was

Resolved, That the committee appointed on the 28th of April last, to consider and report upon the preamble and resolution of the General Assembly of Maryland, relative to the joint construction of the Chesapeake and Ohio canal, and the Baltimore and Ohio railroad, be directed to inquire into, and report upon a plan for accommodating the Baltimore and Ohio railroad, with a passage alongside the canal, which plan, it is understood that the representative of Maryland in this meeting, and the Secretary of the Treasury, together with several stockholders and others most favorably disposed to the views and wishes of the Railroad Company, on this subject, have intimated a desire to have inquired into and considered by this meeting, as if it were an alternative proposition, in case the specific proposition from the Railroad Company, now before this company, should be deemed inadmissible, to wit: to allow the railroad a passage alongside the canal, next the river from the Point of Rocks, to Harper's Ferry, as soon as that section of the canal shall be completed, or to go on with the railroad on that line, from time to time, successively, as successive portions of the canal may be completed.

On motion by Joseph Pearson, esquire, General Walter Jones was added to the committee.

IN MEETING, SATURDAY, *July* 14, 1832.

Colonel George Bomford attended as the proxy of the United States, and Caspar W. Wever, esquire, as the proxy of the State of Virginia.

In Meeting, Friday, *August* 3, 1832.

Anthony C. Cazenove, esquire, offered the following preamble and resolution:

Whereas this company has been requested by the Baltimore Railroad Company to fix upon some plan for the joint construction of the Chesapeake and Ohio canal and the Baltimore and Ohio railroad, from the Point of Rocks to Harper's Ferry, which, from the nature of the ground, does not appear to us practicable, with safety to both works: And whereas two such great and rival undertakings cannot be carried on to completion, without greatly impairing, if not completely destroying, the interests of both; and we are moreover persuaded that every consideration of propriety and interest leads the Baltimore and Ohio Railroad Company to unite with the Chesapeake and Ohio Canal Company, in the magnificent and all-important work of completing the canal to Cumberland, and thence to the waters of the Ohio: It is, therefore,

Resolved, That the Baltimore and Ohio Railroad Company be informed that this company is ready to treat with them for the union, on equitable principles, of the two companies into one, for the construction of the canal from the Point of Rocks to Cumberland, and thence to the Ohio, with the privilege, on the part of the Baltimore and Ohio Railroad Company, to make a lateral canal from the Point of Rocks, or some other to be agreed upon, to Baltimore; or for them to depend upon a basin to be there formed, and their railroad only for their communication with the Chesapeake and Ohio canal.

Which, on motion by William M. Stewart, esquire, was laid upon the table.

Col. George Bomford submitted the following preamble and resolutions:

Experience having demonstrated that the early accomplishment of an intercourse between the Chesapeake and Ohio, whether by canals or railroads, requires the resources of all its friends in one common plan:

Resolved, As the sense of this meeting, that it is highly desirable that the Chesapeake and Ohio Canal and Railroad Companies, instead of applying their means and efforts to different, and, in some respects, rival schemes, should concentrate them on one common object of acknowledged and equal utility to the respective interests affected by it.

That a canal, if not the only practicable, is unquestionably the cheapest mode of transporting lumber and coal, the toll on which will transcend those on all other articles.

That, if the division of the resources of the two companies should, by possibility, have the effect of frustrating the canal, and the railroad should, as it probably would, yield little or no profit on the transportation of these articles, the apprehension of this result must either defeat the railroad altogether, or, if effected, will render almost totally unproductive the immense capital required for its accomplishment: whereas, should the canal be speedily made from the Point of Rocks to Cumberland, and as soon thereafter as practicable to its western termination, every article of commerce may be transported down it to the Point of Rocks, at such an anticipated profit to the company, as at once to ensure the requisite funds, and to render them productive; the more especially as, should the whole transportation be by the canal to the Point of Rocks, instead of being in part by the canal,

and in part by the railroad, such profit will be sure and great, instead of being, as it might be in the contrary event, precarious and trifling.

That, considering the large subscriptions made before the railroad was thought of, by the Corporations and individuals of the District, amounting to about two millions of dollars, constituting more than a tenth part of its entire property, and which, having been principally borrowed, must, at no remote date, be repaid, and which, until repaid, operates as an annual tax of at least one hundred thousand dollars, any measures which should operate either to frustrate or impede the canal, or to shake public confidence in its success and productiveness, would be, in the highest degree, not merely prejudicial to their interests, but likewise fatal to their permanent prosperity, by depriving them of the credit essential to raising the funds requisite to its completion.

Resolved, therefore, That the following propositions, as best fitted to compromise, on principles of justice and reciprocity, all the interests involved, be submitted to the Railroad Company:

1. That the railroad, for the present, terminate at the Point of Rocks.
2. That the right of the Railroad Company to extend the road, after the completion of the canal to Cumberland, and subsequent to the year 1840, be reserved.
3. That, in the mean time, the resources of the two companies be united, and directed to the vigorous completion of the canal to Cumberland, and thence to the Ohio.
4. That the requisite legislative provisions to carry this object into effect be applied for by the two companies.
5. That the dividends on the stocks of the two companies be made pro rata out of the nett proceeds of the tolls derived from the canal and railroad.
6. That in case the Railroad Company should declare its assent to the foregoing terms, either as they now stand, or with any necessary modifications, that a committee of three members of this company be appointed by the President and Directors, to meet a like committee of the stockholders of the Railroad Company; and the said joint committee be, and they are hereby, authorized to make and execute a definitive plan and compact between the two companies, for the purpose of carrying the foregoing propositions into effect.

On motion, by Richard S. Coxe, esq. it was

Resolved, That the preamble and resolutions just offered, together with that previously offered by Anthony C. Cazenove, esq. be referred to the committee appointed on the 28th of April last, on the resolution of the General Assembly of Maryland, relative to the joint construction of the railroad and canal.

On motion by General Charles F. Mercer, Anthony C. Cazenove, esq. and Colonel George Bomford were added to the aforesaid committee.

Richard S. Coxe, esq. stated that the committee appointed on the 28th of April last had received from the representative of the State of Maryland the following letter and proposition; but which, not having been referred by the stockholders, the committee could not entertain:

Washington, (*Gadsby's*) *July* 13, 1832.

Dear Sir: I have considered of, and consulted with those best informed and most interested in, the passage of the railroad along the Point of Rocks, upon the inquiry by General Jones' motion of reference, on Wednesday

last, in the canal meeting. Before I speak of the conclusion to which my mind has been brought on the subject, permit me to say, that, although I could not object to any inquiry, I did not, before its passage, understand that the resolution would bear the precise shape which it has assumed.

As to the plan suggested by the resolution to which I have referred, I am convinced that the difficulties of acting under it are so numerous and serious, not to say insurmountable, that the Railroad Company would save, in expense and time, by constructing an independent road on the land side of the canal.

Notwithstanding I feel most anxiously for the success of the proposition of the Railroad Company, heretofore submitted by me to your committee, from the earnest desire which you signified, and, I am sure, felt, on Wednesday, to advance, as well the interests and progress of the railroad as the canal, I am induced to offer to your committee, and through it to the stockholders, a new and distinct proposition, in which I am authorized to pledge the concurrence of the Railroad Company.

I enclose the proposition, under a conviction that it will be well and fairly considered by the committee, and a hope that its terms will be found so liberal, that it will, at once, be assented to, and recommended to the adoption of the stockholders.

The important and numerous advantages to be secured to the Canal Company, by their acceding to this proposition, are so obvious, that they need not be presented to you by me.

I wish it understood that the former proposition is not withdrawn, but that this is submitted as an alternative, in the event of the terms of the former being considered inadmissible.

If it be thought that I can be of any service by attending the committee, I shall be pleased with an opportunity of meeting them.

I am, dear sir, very respectfully, your obedient servant,

B. S. FORREST.

RICHARD S. COXE, Esq.
Chairman of Canal Committee.

PROPOSITION.

As the agent of the State of Maryland, representing its canal stock, and its wishes on the subject of the contemplated compromise between the Canal and Railroad Companies, I propose that the Railroad Company shall undertake to construct the canal, of its full width of sixty feet, and its full depth of six feet, upon the location for joint construction made by Knight and Roberts, at the narrow passes between the Point of Rocks and Harper's Ferry, for the sum which the canal, as located at this time, is estimated to cost under the present contract prices, to be paid twice a month, or monthly, by the Canal Company to the Railroad Company, in such sums as the engineer of the canal may estimate: and the Railroad Company shall stipulate to finish the said canal on or before the first day of December, 1833, and shall guaranty it to stand, and keep it in repair for the term of five years after its completion.

B. S. FORREST.

July 13, 1832.

NOTE.—If difficulty may be apprehended in consummating the agreement in detail, of which the aforegoing is proposed to be the basis, no objection

will be made to the appointment of an umpire at this time, to be chosen by the two companies, who shall finally settle the details of the arrangement proposed, and all other questions which may arise under it, between the two companies.

The letter and proposition, having been read, were referred to the beforementioned committee.

IN MEETING, SATURDAY, *August* 4, 1832.

RICHARD S. COXE, esq. from the committee to whom the various propositions were yesterday, and on the 11th July last referred, made the following

REPORT:

The committee appointed on the 28th of April last, having taken under consideration the various subjects referred to them since the date of their report of June 16th, beg leave to submit their views in this supplemental report:

In regard to the propositions offered to the Chesapeake and Ohio Canal Company, by, or on behalf of, the Baltimore and Ohio Railroad Company, this committee has, in its report of the 16th June, submitted its views upon the general principles which these propositions involve. The meeting of the stockholders has intimated no dissent from these opinions; and notwithstanding the changes which have occurred in the constitution of the committee, no disposition has been indicated to vary, in any one important particular, from that report.

In considering, therefore, the new subjects referred to it, the committee, as well from the dictates of its own judgment, as from the implied assent given to its views by the general meeting, has not thought it incumbent to add any thing to the reasonings of the former report. It has been assumed that it speaks the language and sentiments of the company at large.

The committee cannot forbear from an expression of its deep sense of the importance of the questions now submitted to the deliberate consideration of the general meeting of the stockholders. The points originally in controversy, between the Chesapeake and Ohio Canal Company and the Baltimore and Ohio Railroad Company, in themselves interesting and important, have become doubly so by the anxiety they have awakened. Every citizen of the community has participated in this feeling. The members of the legislative bodies to which each company is so deeply indebted, have expressed a deep solicitude in the question, and, in particular, that of Maryland, the common parent of both, has exercised its parental influence to produce harmony of feeling, and union of action, among its offspring. This committee will not affect to disguise its sense of the heavy responsibility devolved upon it. We entertain a deep solicitude, not only that the opinions we may express, and the measures we may recommend, may be in themselves just and right, but that they may recommend themselves to the judgment of all who may feel an interest in the subject.

It appeared perfectly obvious to the committee, that it must at once occur to every individual, that the mere circumstance of close contiguity between two such works of internal improvement, could be productive of benefit to neither. It could not, in any particular, enhance the value of the canal, that a rival enterprise was constructed immediately upon its margin,

and it is equally obvious that no stockholder in the railroad would feel that his interests were promoted by a contiguous canal. The most sanguine anticipations of the future growth and prosperity of our country must postpone, for many years, the period when it will exhibit such an accumulation of commodities, and such an increase of business, as will furnish full employment to both works. In the indefinite interval, all the produce which will descend the valley of the Potomac may conveniently be transported on either of these channels of communication, while all the commodities supplied from the sea-board, for the consumption of the interior, must, as is equally obvious, afford much less than full employment to either work. Their proximity to each other limits them to the same range of country.

Without instituting any comparison between the two important projects, or endeavoring to ascertain their relative value as means of intercourse, points upon which great diversities of opinion prevail, it must be sufficiently obvious that, if each of them, separately, possesses the capacity to perform all the business which the country requires, the poximity of a rival enterprise cannot but be pernicious in its influence. If they hold out equal inducements to the merchant and the farmer, they will share, in the same proportion, the business which is to be performed. Ruinous competitions to engross the whole, or an undue proportion of the transportation, may be confidently anticipated; and the two companies will inevitably find themselves occupied in useless and unprofitable, if not destructive collisions. Inadequate profits upon the large amount of capital invested will speedily induce neglect, and neglect will rapidly hurry both to destruction. Should experience demonstrate the decided superiority of either over its rival, the deterioration in the value of the less fortunate, because less useful undertaking, may prompt to self-immolation, as the means of involving both in one common ruin. Fairness and liberality on both sides, with an equal participation in the entire trade, must render the stock of each unproductive to the proprietors.

With these views, which, to the committee, appear undeniable and incontrovertible, we cannot but regard the project of carrying on the two works in immediate contact with each other, as calculated seriously to impair the utility and value of both. So long as they are in juxta-position, all the business performed by one would substantially be so much subtracted from the other; and an application to either, voluntarily to permit the rival work to be carried along its side, does appear to the committee an application to inflict upon itself an enormous if not a vital injury.

Can it for a moment be credited that a single stockholder of either company, with any view to derive a return from his investment, would ever have affixed his name to the subscription list, if the original plan had contemplated the immediate proximity and close contiguity of the rival enterprise? Is one to be found, so confident in the absolute superiority of the work with which he is connected, as not to see, to feel, and to acknowledge, that its value would be essentially impaired by the circumstance that another medium of communication lay in actual contact with his own?

Strongly impressed with the accuracy of these views, the committee is unhesitatingly and unanimously of opinion that the true interest of all parties imperiously demand that the idea of carrying on both the canal and railroad beyond the point of junction should, at least for the present, be abandoned. In this opinion they confidently anticipate the cordial concur-

rence of the intelligent stockholders of the Railroad Company. It is visionary to anticipate, within any moderate period of time, that sufficient occupation should be furnished to both; and should that period happily arrive, the work temporarily postponed may be executed under circumstances far more auspicious than those which at present exist. Under present circumstances we apprehend it will not be controverted that, if the superiority so confidently claimed by our rivals be adjudged to them by the results of experience, the concession, under any terms, of the right to construct a road in immediate contact with the canal, would be suicidal. Should their anticipations not be realized, the injury which would necessarily result to us would not be alleviated by the consideration that our less fortunate competitor had sustained losses still more destructive.

Under a deep conviction that these views are as sound as we know them to be sincere, the committee is unanimously of opinion that the resources and strength of both companies, to complete the canal beyond the Point of Rocks, is demanded by every consideration, as well of public as of private interest. The construction of a basin of competent dimensions at the point of junction, with suitable facilities for the loading and unloading of boats, would secure to each party an equal interest in all the work above. If experience shall demonstrate that either plan is superior to the other, the effect will be obvious, and the advantages will be experienced below the point of divergence. Whichever shall find itself occupy an attitude of inferiority, may still discover topics of consolation in the reflection that important public benefits have compensated for individual losses. The committee therefore recommend that the preamble and resolutions submitted yesterday by Colonel Bomford, be adopted, with such modifications of the *fifth* resolution as shall more distinctly provide that, above the Point Rocks, the canal shall be executed as a joint concern, and the profits distributed according to the contributions of the two parties, while the railroad from thence to Baltimore, and the canal to the District, shall remain separate and distinct in interest. The committee will refrain from suggesting the details of the compact, which ought to be framed with great care and circumspection, in the manner contemplated in the sixth section resolution.

The committee cannot refrain from indulging the hope that the unfortunate and unprofitable controversy which has so long subsisted between the two companies may now be adjusted in the manner which has been proposed. They would willingly postpone even an expression of opinion upon the other subjects referred to them. But, under the instruction they have received, this would be irregular; and they feel called upon to present their views, although no immediate action on them by the company is required.

In regard to the proposition, particularly referred to the committee on the 11th July, which contemplated that the railroad should be permitted to cross the canal at the Point of Rocks, and be extended along the canal on the river side to Harper's Ferry, though not free from serious objections, it is probable that such a plan might be so modified and guarded as to induce the Canal Company so far to yield, in a spirit of compromise. The proposition was presented under so imposing a weight of authority, as to command the most serious consideration; but all hopes of its serving as the basis of an eventual and satisfactory arrangement were destroyed by the early

annunciation, from the representative of Maryland, that it would not be acceded to by the Railroad Company.

The committee will therefore content themselves with an expression of their regret that a suggestion emanating from so high and impartial a source, and which promised such auspicious results, should be disclaimed *in limine* by the party which is asking for concessions.

The proposition submitted by the representative of Maryland, by way of substitute or alternative, contemplates the conjoint construction of the two works between Harper's Ferry and the Point of Rocks, upon the basis of the report of Knight and Roberts. The committee have already submitted their opinion that such a construction would be replete with injury to the Canal Company, and they are unable to perceive, in the unessential modifications in the details of the plan now before them, any thing which is calculated to guard against, or compensate for, the positive evils which they apprehend to be inevitable.

The committee concur in recommending the adoption of a resolution, requesting the President and Directors to make application to Congress, and the several other parties to the charter, for such additional subscriptions to the stock of the company as will ensure the speedy and efficient prosecution of its works to the coal banks above Cumberland; but, entertaining a decided opinion that no reasonable doubts can exist upon the subject of a forfeiture of the existing charter, they deem it inexpedient and unnecessary to present this subject to those authorities.

Signed on behalf of the committee.

RICHARD S. COXE, *Chairman, &c.*

The adoption of the report being under consideration, Benjamin S. Forrest, esq. offered the following resolution as a substitute therefor:

Resolved, That it is expedient and proper to accede to the wishes and recommendation of the State of Maryland, expressed in a preamble and resolution passed by the General Assembly of Maryland, and referred to a committee by the stockholders of the Chesapeake and Ohio Canal Company, in meeting on the 28th of April, 1832; and the President and Directors of the Canal Company are hereby required, as soon as possible, to enter into such reasonable agreements and contracts with the Railroad Company, as may be necessary for passing the canal and railroad along the narrow passes between the lower Point of Rocks at Harper's Ferry.

Benjamin L. Lear, esq. moved to amend the substitute offered by Mr. Forrest, by striking out the words "the wishes and recommendation of the State of Maryland, expressed in a preamble and resolution passed by the General Assembly of Maryland, and referred to a committee by the stockholders of the Chesapeake and Ohio Canal Company, in meeting on the 28th of April, 1832," and inserting the words, "the proposition of the Baltimore and Ohio Railroad Company."

The motion to amend was agreed to.

The question was then put upon the adoption of the substitute as amended, and it was lost; ayes 1,423, noes 7,962.

Benjamin S. Forrest, esq. then proposed to strike out the report of the committee, and insert the following resolutions:

Resolved, That it is hereby made the duty of the President and Directors of the Chesapeake and Ohio Canal Company to agree with the President and Directors of the Baltimore and Ohio Railroad Company, for the construction

of the canal, with its full width of sixty feet, and its full depth of six feet, upon the location for joint construction made by Knight and Roberts, at the narrow passes between the Point of Rocks and Harper's Ferry, provided the said Railroad Company will do the same for the sum which the canal, as located at this time, is estimated to cost, under the present contract prices, to be paid monthly by the Canal Company to the Railroad Company, in such sums as the engineer of the canal may estimate; and provided, also, that the said Railroad Company shall stipulate to finish the said canal, by or before the period at which the Canal Company shall be prepared to introduce water in the canal for navigable purposes, from the feeder next above Harper's Ferry, and guaranty the canal so made by said Railroad Company to stand, and to keep it in repair for the term of five years after its completion.

Resolved further, That before the said agreement shall be entered into, an umpire shall be appointed by the two companies, who shall finally settle any details necessary for effectuating the agreement mentioned in the aforegoing resolution, and all other questions which may arise under said agreement between the two companies.

Richard S. Coxe, esq. moved that the question be divided, and the question was put upon the motion to strike out the report; which was disagreed to.

William M. Stewart, esq. proposed to add to the report the following:

The stockholders of the Chesapeake and Ohio Canal Company having had under consideration the resolution of the Legislature of Maryland, advising and recommending the assent, on the part of this company, to the proposition of the Baltimore and Ohio Railroad Company, for the joint construction of the railroad and canal from the Point of Rocks to Harper's Ferry:

Resolved, 1st. That the object of the Canal Company being, as declared in their charter, "to extend and multiply the means and facilities of internal commerce and personal intercourse between the two great sections of the United States," it is not the wish or intention of this company to retard or interrupt the progress or construction of any other work having a similar object in view.

2d. That the deep and immediate interest which Maryland has in all works of internal improvement within her borders, and the liberality which she has shown to this company, renders any request on the part of that State especially worthy of consideration.

3d. That, in order to promote the cause of internal improvement, propitiate all parties, manifest a disposition to yield to the wishes of the State of Maryland, and, by establishing a good understanding between the two, create such a union of interests as will be mutually beneficial, the proposition of the Railroad Company, as made through the agent of the State of Maryland, be accepted, and the President and Directors are hereby authorized and directed to carry the agreement into effect.

John Marbury, esq. demanded the previous question, and the call being sustained by the meeting, the question on the adoption of the report of the committee was put and carried; ayes 7,961, noes 1,415.

The foregoing are true extracts from the proceedings of the stockholders of the Chesapeake and Ohio Canal Company, in general meeting.

Attest: JOHN P. INGLE,
Secretary of the Meeting.

As the location of the canal at both Points of Rocks preceded the contracts for its construction; as these were made before the Legislature of Ma-

ryland had considered the Baltimore proposition, and, consequently, before any opinion in relation to it had been expressed by that honorable body, it is evident that the location of the canal could not have been changed, as charged, "in defiance of the known and expressed wishes of the State of Maryland."

But the facts show that the location was not, and could not have been changed, in the difficult passes to which the Baltimore proposal referred, at any time, for the illiberal purpose imputed to the Canal Company.

There was not, in truth, at either Point of Rocks, sufficient room, without incurring a heavy expenditure, for either a canal or a railroad. For the construction of either, without reference to the other, it was obviously necessary to occupy a part of the bed of the river Potomac, at all times cover with water. The admission of a railroad between the canal and the overhanging cliffs of rock, as was proposed, was calculated to protrude the latter farther into the rapid current of the stream, and into deep water. The expensive controversy between the two companies, decided, after a delay of three years and a half, only a fortnight before the date of the railroad proposition, grew out of this peculiar formation of the river banks, for distances below Cumberland and above the Point of Rocks, making together 47 miles.

As soon as that controversy ceased, the Canal Company, as in duty bound, proceeded to construct the canal along the very ground early marked out, and so long injuriously withheld from them, without any reference whatever to the recent controversy, or to the claims of the Railroad Company: which, no longer constituting an impediment to their progress, were no longer considered.

They consulted, in the location, security, convenience, and economy. That they looked to these considerations, and these alone, conclusive evidence is furnished by a document of record in the court of chancery at Annapolis. It is the report of the engineers of the two companies, Messrs. Roberts and Knight, empowered to estimate the actual and relative cost of a separate location and construction; of a joint location and independent construction; and of a joint location and joint construction of the two works.

On examining that report, it will be seen that those engineers computed the cost of a canal, located and constructed at the two Points of Rocks, for a distance of but 5,156 feet, without reference to the railroad, at $68,889.

Now, if the location of these gentlemen, the dimensions and plan of the canal being the same, had been subsequently changed, with a view to shut out the railroad, it must have been effected, by pressing harder upon, or extending the canal into, the neighboring cliffs of rock, and, consequently, at an enhanced cost. So far, however, from this being the fact, the actual canal, exclusive of two culverts and a lock, also excluded from the former estimate, and embracing, not the 5,156 feet only, but a space of 2½ miles, and now very nearly completed, it has been clearly ascertained, will cost less than 57,000 dollars, making a difference in favor of the company, provided the intermediate work, not comprehended in the above estimate, be computed, of at least 20,000 dollars.

It is impossible to conceive a more complete refutation of the injurious charges upon the Canal Company, than the preceding statement of undeniable facts supplies. But may not candor supply another?

The works of the Canal Company are conducted by their president and

directors, under the authority vested in them by the charter of the company, which is a compact between three States, the United States, and the Potomac Company—a company which had an existence long antecedent to the incorporation of the Chesapeake and Ohio Canal Company, and which was, itself, the offspring of the concurrent legislation of two States, alike interested in the navigation of the river Potomac, their common boundary.

The stock of the *new*, now consists of that of the old campany, augmented by a subscription of 3,609,200 dollars. The interest of the State of Maryland, one of the parties to the charters of both companies, in the new subscription, amounts to 500,000 dollars, which is less than one-seventh of the available resources, for the completion of the contemplated canal; a canal expected to unite the waters of the Chesapeake with those of the Ohio at Pittsburgh, at the cost of 12,000,000 of dollars.

Have this company power to sacrifice the end of all these concurrent acts of legislation to the pleasure of one of the three States who are parties to their charter? Have they a right to sacrifice the interests of the stockholders of the Potomac Company, with whom those States have expressly treated, not for the construction of a canal and railroad, but of a canal to connect the waters of the Chesapeake and the Gulf of Mexico, by the Potomac and Ohio rivers? If an authority "*so suicidal*," as a member of the General Assembly, and the author and mover of the resolution in question, has styled any sacrifice of the interests of the canal to those of the railroad, be not vested in the Canal Company, then there is an end of all question on the subject. But, if a doubt may be supposed to exist, as to the tendency of any proposed measure to involve such a sacrifice, to whom, let it be asked, should the Canal Company apply for advice and information? Should they not apply to their own scientific engineers, whom they employ for the purpose of planning, locating, and constructing their canal? And if, having consulted them, they are all found, without an exception, to concur with other scientific and disinterested men in dissuading the officers and stockholders of the company from acceding to such a proposition; if they shall all say that its acceptance involves a ruinous delay of the progress of the canal, and an enhanced cost of all its works; that it exposes those works to augmented hazard, the future commerce of the canal to great uncertainty, and diminishes greatly its actual utility to the adjacent States: shall the president, directors, and stockholders, after investing and receiving, disregard this advice? Could they do so, under the circumstances of this case, without manifesting a want of that high respect which they all, without exception, entertain for the State of Maryland and her enlightened Legislature? For, what stronger evidence of disrespect could they offer than to doubt the justice of Maryland, and the wisdom and candor of her statesmen?

What those engineers have, on their oaths, testified, as well as reported on this subject, is hereto subjoined; and, to this evidence, the attention of the General Assembly of Maryland is now respectfully invited, in reply to a groundless accusation.

Extract from the record of proceedings in Court of Chancery in Maryland.

BALTIMORE AND OHIO RAILROAD COMPANY, *Complainants,*
vs.
CHESAPEAKE AND OHIO CANAL COMPANY, *Defendants.*

WASHINGTON, *25th Oct.* 1830.

Interrogatories put to Nathan S. Roberts, a witness produced by the defendants, on behalf of said defendants.

1st interrogatory. Is the report of Jonathan Knight and yourself, with the surveys, explanatory notes, profiles, &c., accompanying the same, and lately returned into the court of chancery, the joint report of Mr. Knight and yourself, as commissioners appointed to carry into effect the Chancellor's decree; and was that report, officially made by you as commissioners, and, as in compliance with the concurrent instructions received from both parties, to make report of your proceedings when you reached Harper's Ferry?

Answer to the foregoing interrogatory. It was so intended.

2d interrogatory. Is what you describe in that report, and the surveys &c. accompanying the same, as the independent line of the canal, intended to represent the same location and line of the canal described in the previous surveys by Mr. Geddes and yourself, and in the subsequent surveys by the engineers of the Chesapeake and Ohio Canal Company?

Answer to the foregoing interrogatory. In running the line with Mr. Knight, I was not guided by previous surveys, but ran the independent line according to my best judgment; and I do not believe it possible, from the nature of the ground, that it could have differed much from the previous surveys. I do not recollect, that, in the most difficult passes, it could have exceeded, at any point, more than from two to five feet, and, in the less difficult passes, not more than six or eight feet, and often ran on the same track. In many places, I saw Mr. Cruger's stakes standing, and nearly on the same line, and found the marks and lines cut by Mr. Geddes and myself. I had, in running the line, with me, the former surveys, made by Judge Geddes and myself, in 1827 and 1828, and by Mr. Cruger, in the winter of 1828 and 1829.

3d interrogatory. You have spoken of variations between the lines of the former surveys, and that you made, as commissioner, as the independent line: were those variations greater than usually occur between the survey made for the actual execution of a canal, and such actual execution?

Answer to the foregoing interrogatory. I suppose they were not.

4th interrogatory. Does such independent line and location of the canal constitute the only eligible location for the canal on that route, if the railroad were out of the question?

Answer to the foregoing interrogatory. In my opinion it was the only eligible location that could be made, with the variations before stated in answer to the 2d interrogatory.

5th interrogatory. (To this interrogatory, the complainants, by their counsel, objected.) What are the comparative advantages and disadvantages to the canal, besides the increased cost, stated in your report, of such independent lines and location, and the one suggested in your and Mr. Knight's report, as a compromise between the parties?

Answer to the foregoing interrogatory. The comparative advantages and disadvantages in constructing the canal, independently or conjointly. The advantages of an independent location and construction of the canal are, a diminished expense in construction, and more safety to the banks and works

of the canal in particular places, when safety might be consulted, by throwing the canal further into the rocks, &c. And, in all places along the narrow passes, the greatest advantage could be taken of the location, and for obtaining materials for constructing the canal, without the inconvenience of crossing the railroad, or of giving it the first choice of ground, and the most convenient materials. The advantages of approaching the canal for the purposes of commerce, unobstructed by the railroad along the margin of its berm bank, must be, in many instances, very great, as it frequently occurs that valuable stone quarries and timber are found in the vicinity of the passes, which, in finding its way to the canal, would naturally and unavoidably occupy the tract or site of the proposed railroad. The same objection would hold good to a greater or less extent in all places where the railroad should be confined to the berm bank of the canal, which is the only side which can be conveniently approached, at all times, for loading and unloading boats, &c.

Having the railroad on the berm of the canal, might, in some instances, protect the canal from the waste and slips from the hills above, which would, in part, compensate for the risk of supporting the canal in the increased depth of water; but it is not probable that this would compensate for all the contingencies to which the canal, thus situated, would occasionally be exposed. This is the principal benefit that the contiguity of the railroad can be to the canal.

6th interrogatory. (To this interrogatory the complainants, by their counsel, objected.) Please to refer to the former reports and surveys of Mr. Geddes and yourself, and to your knowledge and recollection of all the localities from Cumberland to Harper's ferry, on the route proposed for the canal, in the reports and surveys of Mr. Geddes and yourself, and state, as minutely as you can, the comparative difficulties to be encountered for constructing the canal independently, without reference to a railroad, on that part of the route, as compared with the difficulties presented on the route from Harper's Ferry to the Point of Rocks, whether the number and length of the narrows and difficult passes occurring on the upper route, and the inherent difficulties in the nature of passes themselves, be greater or less in proportion to distances as the route proceeds above Harper's Ferry, and describe the circumstances and localities which illustrate the difficulties of the upper route, and the practicability of carrying both the canal and railroad together through the passes above Harper's Ferry; state particularly whether you think it practicable for the canal to be constructed on that route from Harper's Ferry to Cumberland, if the railroad were to prevail in establishing a prior choice of location on that route, and the canal left to occupy what might remain after the most eligible ground had been occupied by the railroad.

Answer to the foregoing interrogatory. From the report of Mr. Geddes and myself:

1st subdivision, ending at the South Branch of the Potomac, passing the narrows, Braddock's hill, and Alum hill; and other steep rocky cliffs near the South Branch, (canal substituted for tow-path) omitting fractions, Miles, 8

2d subdivision, ending opposite the mouth of Great Cacapon; passing Gregg's mountain, and other vertical cliffs, - - 13

3d subdivision, ending at Licking creek; passing very difficult rocks above Hancock, and in some other places, - - 3

4th subdivision, ending at Williamsport; passing high limestone rocks below North mountain, Prather's Neck, and steep and bold rocky shore; passing Charles' mill, &c. - - Miles, 11

5th subdivision, ending at Antietam; passing Galloway's mill, and other steep and vertical rocks, above Shepherdstown, - - 8

6th subdivision, ending one mile below Harper's Ferry bridge, 3 miles, - - - - - - } 2
Deduct 1 mile, - - - - - }

Amounting in the whole to about, - - - Miles, 45

It is believed that nearly the whole of this distance would consist of embankments along the margin of the river, in water from two to eight feet deep, and from fifteen to thirty feet from shore, at usual low water. This was the opinion of Judge Geddes and myself, as appears from our joint report on that survey. And in case of a location, in conjunction with the railroad, the canal would move from ten to twenty, and, in some of the most difficult points, probably thirty feet further in the river, with a proportionate increase of depth of water, provided the railroad is continued thirty feet wide in such places. The distance from the Point of Rocks to Harper's Ferry is a fraction over twelve miles, and the parts in collision amount to 11,153 feet, or about 930 feet per mile, on the average. The distance from Harper's Ferry to Cumberland, 127 miles, and the proportions which would come in collision, amount to 45 miles, equal to 237,600 feet, or about 1,870 feet per mile on the average; which shows that the difficulties above Harper'r Ferry are in proportion to those between that place and the Point of Rocks, as $\frac{1870}{930}$ or as two to one. And as the increased expense to be borne by both companies, in the estimated joint construction from the Point of Rocks to Harper's Ferry, is twelve thousand dollars, omitting fractions, or one thousand dollars per mile, the same proportionate increase of expense from Harper's Ferry to Cumberland would amount to one hundred and twenty-seven thousand dollars, to be incurred by each company, or two hundred and fifty-four thousand dollars by both companies, in case of conjoint construction of the railroad and canal for that distance; and is it believed from recollection, and from viewing the maps and report of Mr. Geddes and myself, that the inherent difficulties in the nature of the passes, consisting of length and steepness of rocky narrows, depth of water, and increased amount of wall and embankments, and the increased difficulties of obtaining materials for the same, would probably increase the extra expense of a conjoint construction to a sum considerably greater than is shown by the above proportion.

These localities and difficulties can be more clearly and identically illustrated by reference to the maps and profiles, and the estimates of distances and expense, as reported by Mr. Geddes and myself, as above alluded to. If the railroad were to prevail in establishing a prior choice of location, along those difficult passes between Harper's Ferry and Cumberland, as herein alluded to, it would render it extremely difficult and expensive to locate and construct the canal along the same narrow passes, in a strong current and in deep water; and, considering the great extent and length of those difficulties, it would seem to amount to almost an impossibility; and, if made at all, it must be at a very great and unusual inconvenience and expense; and I think

could not be recommended by any practical engineer, as all the rock for walls, and the materials for embankments, and for all other purposes of the canal, must unavoidably be brought across the railroad, and, probably, in some instances, from Virginia; which inconveniences would be destructive to the railroad, in many instances, and would be a continual source of differences and collisions between the two companies, if the canal were constructed at all on the Maryland side of the Potomac.

It is my desire to be distinctly understood, that the survey, as made by Mr. Geddes and myself, from which the above calculations are derived, was made distinctly for the purpose of a canal, without any view to a railroad whatever.

Cross-interrogatories put to Nathan S. Roberts by the complainants, by their counsel.

1st cross-interrogatory. Would it, or would it not, be practicable to ascertain the difference of cost of the construction of a canal and railroad on independent locations, respectively, and on joint location with a view to compromise, between Harper's Ferry and Cumberland, as has been done between the Point of Rocks and Harper's Ferry?

Answer to the foregoing cross-interrogatory. It would be practicable.

2d cross-interrogatory. Would it, or would it not, be necessary, in order to know the comparative expense of a joint construction on a joint location, and an independent construction on an independent location, that you should be acquainted with the independent location of both the works contemplated to be carried on?

Answer to the foregoing cross-interrogatory. Certainly it would.

3d cross-interrogatory. Are you acquainted with the independent location of the railroad above Harper's Ferry, at the points considered by you as points of difficulty on the left bank of the Potomac?

Answer to the foregoing cross-interrogatory. I do not know of any such locations.

4th cross-interrogatory. Do you, or do you not, know whether any of the different passes or points along which the canal must necessarily be carried, can be avoided by the railroad, and, at the same time, collision between the two works avoided?

Answer to the foregoing cross-interrogatory. I only know from hearsay, at the points alluded to in this interrogatory.

Witness re-examined by the defendants, by their counsel.

1st interrogatory. (To this interrogatory the complainants, by their counsel, objected.) What would be the expense attending such a joint survey from Cumberland to Harper's Ferry, as indicated in the complainant's first interrogatory? Is such expense included in the estimate you have made of the additional cost of a joint construction? What time would be necessary to complete such conjoint survey?

Answer to the foregoing interrogatory. In proportion to the expense of the survey between the Point of Rocks and Harper's Ferry, the cost of the survey from Harper's Ferry to Cumberland, to the Canal Company, would be $53,578. It might be more, but would not probably be less. The expense attending the surveys made by Mr. Knight and myself, as commissioners, were paid by the companies, respectively, and are not included in our report

made to the Chancellor. The expense above mentioned, of $53,578 is not included in the estimate which I have given in answer to the 6th interrogatory in chief of the expense which would probably attend the joint construction of the two works from Harper's Ferry to Cumberland. The time of survey employed between Harper's Ferry and the Point of Rocks, was about three months' actual employment; and in this proportion it would take about seventy-two months from Harper's Ferry to Cumberland; which would not be reduced less than half the time, if the same accuracy in the calculations and drawings were required, as have been required between the Point of Rocks and Harper's Ferry, unless more than one company was employed.

5th cross-interrogatory. In your calculations of expense, do you assume it as a fact, that the two works will be in collision at all the difficult passes mentioned by you in your answer to the 5th interrogatory in chief?

Answer to the foregoing cross-interrogatory. I do.

6th cross interrogatory. In your answer to the 6th interrogatory of the defendants, do you consider the two works as executed jointly and simultaneously, when you speak of the advantages and disadvantages which the railroad would cause to the canal?

Answer to the foregoing cross-interrogatory. If they were not executed simultaneously, the expense would be greatly increased beyond the estimate made by me in answer to the 6th interrogatory in chief.

In verification of the foregoing answers to the interrogatories and cross-interrogatories put to me, I have hereto subscribed my name.

NATHAN S. ROBERTS.

26TH OCTOBER, 1830.—Commission continued.

Interrogatories put to J. J. Abert, a witness produced by the defendants, in behalf of the said defendants.

1st interrogatory. Did you survey the valley of the Potomac with a view to the location of the Chesapeake and Ohio canal? How much did you personally aid in surveying? and when?

Answer to the foregoing interrogatory. I surveyed the valley of the Potomac in 1824 and 1825, with a view to the location of the Chesapeake and Ohio canal. I have personal knowledge of it from that survey from the mouth of Savage river down to Berlin. At Berlin, I was taken sick, and have not personal knowledge of it below. It was finished by Lieutenant Swift, who was one of my assistants, and succeeded me in command in the field.

2d interrogatory. (To this interrogatory the complainants, by their counsel, objected.) From the knowledge which you possess of the valley of the Potomac, between Cumberland and Harper's Ferry, is it, in your opinion, practicable to locate the canal on the Maryland side of the line in any other position than immediately in that valley; and, where that valley is narrow, on the bank of the river?

Answer to the foregoing interrogatory. The survey was a preliminary survey, with a view to guide me in the location afterwards; but great pains were taken that this preliminary survey should occupy what, in my judgment, was the best location of the canal; and the immediate valley of the Potomac cannot, in my opinion, be abandoned for the canal, except at three points: one called the Prather's neck, one between Evet's creek and the

narrows of the Potomac, and one a short distance just below the bench mark at Cumberland, where the rocks close in upon the river, as denoted in the surveys, plans, and profiles; the canal will have to occupy as near the river as possible, to lessen the expense. What we call a canal impracticability would exist in leaving the river, the expense in consequence being so enormous.

3d interrogatory. (To this interrogatory the complainants, by their counsel, objected.) In what are called the narrow passes on the river, would it be practicable to vary the location of the canal, by carrying it further into the mountain, or further towards the river?

Answer to the foregoing interrogatory. Not without vastly increasing the expense. If you go into the rock, you encounter very great excavation of rock; if you go into the river, the constructions would have to be very strong and high to resist freshets, and would also have to be built in water, which are attended with increased expense, and of doubtful stability. The height of the freshets are noted on the map. I was shown a mark at Williamsport, at which the water had risen twenty-eight feet above the stage of low water. The high water mark, as shown to us, is designated on the profiles throughout the survey. Many of the narrow valleys were not occupied by the survey, being liable to inundation from the freshets, and we were compelled to go upon the edge of the hills.

4th interrogatory. (To this interrogatory the complainants, by their counsel, objected.) Is there any considerable distance between Cumberland and Harper's Ferry, in which a canal must, from the nature of the ground, be carried into the river?

Answer to the foregoing interrogatory. There are many such places, where one side of the canal would have to be sustained by a wall from the bottom of the river.

Cross-interrogatories put to J. J. Abert by the complainants, by their counsel.

1st cross-interrogatory. Are not some of the rocky passes of the Potomac accompanied by a depression in the ridge towards the interior, which might be practicable to a railroad, but presenting a canal impracticability? Did you not survey some such for the canal, and are they not located and represented on the map?

Answer to the foregoing interrogatory. I made the survey with reference to a canal only, not having a railroad on my mind. There are four places located on the map or profiles, in which we made experiments to see if the rocky passes or bends on the river, at these places, could be avoided. This was the object; but the ground rose so high we were obliged to continue on the river. There are two places near Alum Hill, at which these surveys in the interior were joined to the main lines of survey on the river at both ends, and completed. In the other two cases, finding the path evidently impracticable for a canal, they were not carried through at both ends to the main line of the canal. One of these was in Virginia, near Mr. Colston's farm. I think a railroad practicable near Alum Hill, where these experimental lines went into the interior, and joined both ends of the main line. The other two experimental lines being incomplete, I cannot answer positively on those lines.

2d cross-interrogatory. In order to estimate the advantages or difficulties at the difficult passes on the Potomac river, where the two come in collision, occasioned by the independent or joint location and construction of a canal and railroad at these passes, would it not be necessary that the exact independent location of both, and line of joint location, should be ascertained, and investigations and calculations made accordingly?

Answer to the foregoing cross-interrogatory. I should think no accurate estimate could be made without.

Witness re-examined by the defendants, by their counsel.

Interrogatory. (To this interrogatory the complainants, by their counsel, objected.) Are there any difficult passes on the river for a canal, in which the ground did not present any probability of being able to avoid them by going into the interior?

Answer to the foregoing interrogatory. There are many places of that kind. I have already enumerated the only places in which I thought the valley of the river could be left. These places are platted on the profiles.

In verification of the foregoing answers to the interrogatories and cross-interrogatories put to me, I have hereto subscribed my name.

JOHN J. ABERT.

Interrogatories put to Alfred Cruger, a witness produced by the defendants, on behalf of said defendants.

First interrogatory. Are you one of the engineers appointed by the President and Directors of the Chesapeake and Ohio Canal Company? What is the nature of the duties of your appointment, and how long have you acted as such?

Answer to the foregoing interrogatory. I am one of the engineers appointed by the President and Directors of the Chesapeake and Ohio Canal Company. The nature of my duties has been various. I am now engaged in superintending the construction of twenty-two miles of the canal, i. e. near Seneca to the Point of Rocks; and have been in their service two years.

Second interrogatory. Look at the maps Nos. 1, 2, and 3, and profiles now shown you, (here is exhibited to the witness the documents referred to in defendants' answer, and designated in the schedule No. 35,) and say whether those surveys, &c. were executed by you, and when, as such engineer? What points, and what distance of the route of the canal do those surveys and profiles embrace? Were they executed by you in obedience to instructions from the President and Directors, or their principal engineer, and for what purpose was the part of the route that is embraced in those surveys and profiles prepared to be put under contract for practical execution, on the completion of those surveys and profiles?

Answer to the foregoing interrogatory. These maps, Nos. 1, 2, and 3, and profiles now shown me, are correct copies of the original maps of the survey and location executed by me in the winter of 1828 and 1829, as an engineer in the service of the Chesapeake and Ohio Canal Company. And the points embraced by this survey lie between the Point of Rocks, at the Catoctin Mountain, and the Conococheague, at Williamsport, a distance of fifty-one miles. They were executed by me, in obedience to an order from

the President and Directors, and in conformity with instructions from the engineer-in-chief. The object of this survey and location was to prepare for the constructions of the work the ensuing spring, when it was contemplated to have a letting at Harper's Ferry, and place the whole under contract.

Third interrogatory. (To this interrogatory, the complainants, by their counsel, objected.) Have you had any opportunities of informing yourself, as an engineer, of the facilities and difficulties attending the construction of the Chesapeake and Ohio canal, on the route from the Point of Rocks to Cumberland, on the left bank of the river? Explain what opportunities you have had of observing that route, and becoming acquainted with its localities, and then refer to the fifth interrogatory to Nathan S. Roberts, and answer it circumstantially?

Answer to the foregoing interrogatory. The only opportunities that have offered themselves to form an opinion of the facilities and difficulties attending the construction of the Chesapeake and Ohio canal, from the Point of Rocks to Cumberland, occurred in the examination spoken of in the second answer; and that opinion is consequently limited to the portion between the points embraced in that survey, which presents alternately difficult and easy ground for the construction of the canal. The pass at and above Harper's Ferry is more difficult than any below, and that at Galloway's Mill far more difficult than that at Harper's Ferry. The pass at Galloway's Mill, above Marsh Run, continues for two miles; it will be necessary, at that place, to construct the canal in eight feet water, by the side of a perpendicular cliff of limestone rock, from eighty to one hundred feet in height. The canal will occupy one-sixth of the bed of the river, and be constructed entirely in it. There are many other difficult passes, most of them more difficult than the Point of Rocks, at the Catoctin mountain, and which offer serious difficulties in the construction of the work.

In answer to the fifth interrogatory to Mr. Roberts, I will state, that the only advantage I conceive the canal can derive from the construction of the railroad by its side is, the check it may give to the wash from the hills. This advantage is less important than at first it appears to be, as this wash will be led by drains along the upper side of the railroad, and passed under it occasionally by small culverts. The situation of the canal, then, and the expense of back drains and means used to protect the canal from injury of this description, will be the same as if no railroad existed. The disadvantages of the canal, arising from the construction of the railroad by its side, are,

First. The greater hazard in placing the work further into the river, thereby exposing it to the danger of freshets in the river, and increasing the cost for repairs probably five per cent.

Secondly. Entirely cutting off the communication between the country and the canal in some places, and interrupting it at nearly all others; debarring the canal of the advantages it would enjoy, were it perfectly accessible at all points, thereby directly injuring its commerce.

Thirdly. Increasing the difficulty of cost of procuring materials for the repair or improvement of the canal, probably ten per cent.

In verification of the aforegoing answers to the interrogatories propounded to me, I have hereto subscribed my name.

ALFRED CRUGER.

Report of Alfred Cruger, Resident Engineer of the Chesapeake and Ohio Canal, on certain inquiries submitted by the representatives of the stock owned by the States of Maryland and Virginia, to the President and Directors of the Chesapeake and Ohio Canal Company, and by them referred to the Resident Engineer.

WASHINGTON, 15*th June*, 1832.

GENTLEMEN: In answer to the interrogatories which are submitted to the Board of Directors by the proxies of the States of Maryland and Virginia, and to which my attention has been directed by the President of the company, I hereby report:

That the present position of the locks, and their lifts, or elevations, remain the same as they were located in 1828, by myself, but differ from the location of Mr. Roberts, in his independent location. Around the difficult passes, the position of the canal continues the same, within a few feet to the right or left, as by the location of 1828. Through the level ground, between the Points of Rocks, and above them, the line follows pretty nearly the route designated by Mr. Roberts, sometimes to the right, and again to the left, not so much on the river bank as the location of 1828. The quantity of excavation, &c. will be generally diminished by such changes, which were mainly the motives by which the engineer was governed in this change.

In order to explain fully to the board all the considerations which influenced us in the location of the canal, it will be necessary to enter more into detail. The instructions from the engineer-in-chief, in 1828, were, on the river bottoms, to occupy, as closely as possible, (consistent with the safety of the canal) the river bank, for these reasons: to obviate the necessity of being compelled to construct bridges across the canal, for the accommodation of proprietors whose lands might lie between the canal and river, or to be compelled to purchase these parcels of land, and with a view to the diminution of the expenses for the condemnation of land, and erection of fences. To secure to ourselves these benefits, it was found to be attended with increased cost of construction and hazard to the canal; so that, in our subsequent location, *last winter*, we followed, with some little and unimportant deviation, the location of Mr. Roberts, to Berlin, thence to Harper's Ferry. It is impracticable, or highly inexpedient, to differ much from a certain route, which has been adopted by all the engineers, in all preceding locations, except near Wever's Mill, where, for considerations of economy and expediency, it was deemed proper to run the canal alongside of, and nearly parallel with, the public road, to Miller's Narrows. The fact having since (1828) been ascertained, that the company were not compelled to construct bridges across the canal, but might substitute ferries, the inducement, on that account, to adhere to the river bank, was removed. The considerations which governed us in the selection of the route, were founded entirely upon economy of construction, and security from danger of the high water of the Potomac. That changes should be made in the location, is not a matter of surprise to engineers, particularly on ground presenting so many difficulties, and points requiring so much consideration. Changes are always made when a plan is laid down for construction, differing from that intended to designate the general route of the canal; changes are made, and have been made, on the points in question, even after the work has been commenced, when the operations have sufficiently advanced on the ground, (which was before doubtful in its character,) to satisfy the engineer that a change would

be expedient; and a change has been made on one section alone, by placing it further on the hill, which presented the appearance of much rock, but which exhibited, upon being opened, a much larger portion of good clay than could have been anticipated; the effect of which will be, to produce a saving of several thousand dollars in the construction; for the amount of wall is diminished: no embankment but what will be furnished from the canal excavation, will be required; and there will even be a surplus quantity of earth to go to the adjoining section, thereby producing a similar effect, so far as that quantity goes, on that section, in reducing its estimated cost. These considerations alone actuated us; and no communication from the board was ever made me, or from any of its members in their individual capacity, which had, or could bear the interpretation, that any other motives should influence me. We were left free to act, and make such a selection as, in our opinion, as engineers, would permit the construction of a most economical and safe canal. We considered that, as the decree of the Chancellor of Maryland had been reversed, and the suit between the Railroad and Canal Companies terminated, no arrangement was necessary for the accommodation of a railroad by the side of the canal, nor, on the other hand, was it deemed necessary to increase the cost of constructing the canal by removing it one foot further into the rocks, to guard against the interference of the railroad, which had been effectually arrested by the late decision of the Court of Appeals. We progressed, and located the canal as if the Railroad Company had never been in existence.

The changes are not important between the location of 1828 and that of 1832; and the difficulty of constructing a railroad on the margin of the canal is not greater, in one instance, than in the other. The reason why the location of 1828 was not adopted as the location for the construction for 1832, was, that, in the interval of time, the stakes by which it was marked out, were either decayed or removed in the subsequent surveys by the commissioners under the decree of the Chancellor, and that an entire new survey was necessary, as nearly all the traces of the first location were obliterated; it also gave the engineers a further and better opportunity of selecting the best route, by the various comparisons it enabled them to make between the advantages and disadvantages of the different routes.

Respectfully submitted.

ALFRED CRUGER, *Resident Engineer.*

To the PRESIDENT AND DIRECTORS
of the Chesapeake and Ohio Canal Company.

That the views taken in the preceding exhibit have not arisen, at the canal board, in consequence of the favorable issue of the late legal controversy between the Canal and Railroad Companies, the following extract is hereto annexed, from an antecedent report of the President and Directors of the Canal Company, to the same committee of the House of Delegates of Maryland, to which the contemporaneous report of the President and Directors of the Railroad Company, heading this exhibit, was made in January, 1831.

"The committee have extended their inquiry through the letter of their chairman, not only to the nature of the legal difficulties which obstruct the progress of the canal, but have generously condescended to ask whether any action of the Legislature of Maryland may be calculated to remove them.

"Though thus invited to suggest what might seem, to their judgment, expedient on this subject, the undersigned, confiding in the wisdom and justice of the Commonwealth of Maryland, beg leave to decline any expression of opinion in relation to it.

"One thing is due to themselves and to their constituents: it is to say, that had they, and those whom they represent, not most confidently believed, that the ground over which the Chesapeake and Ohio canal had been so long located, or marked out, under the authority of the States who are parties to their charter, had been assured to them by the concurrent acts of those States, they never would have embarked their capital in this enterprise.

"The undersigned are far from intending to complain of the charter granted to the Baltimore and Ohio Railroad Company; on the contrary, they believe that the route now claimed for that road by the President and Directors of that company, entered not into the conception of any one member of any of the Legislatures who concurred in their charter.

"At the moment at which their charter was sought, by a part of those gentlemen, all idea of a future collision between the route of their road and the known location of the canal, was, *by their own proceedings and declarations*, absolutely excluded.

"The undersigned having, with good faith, and a diligence not often surpassed, under difficulties rarely if ever encountered by any similar enterprise, not only succeeded in obtaining a prior charter by a compact of four distinct Governments, fortified by the antecedent rights of the Potomac Company, and among them, that of constructing the very canal in question, but made up the far greater part of the sum required to construct a canal through the valley of the Potomac, within a very short period after their books of subscriptions were first opened, are confident that they will be sustained by the justice of Maryland, as well as by the plighted faith of her Legislature, in the prosecution of their great work.

"Though not presuming to suggest a remedy for it, they cannot but deplore the delay which the canal has experienced, and which is likely yet to endure, while the limitation of their charter, requiring one hundred miles of the canal to be finished in five years from its commencement, sufficiently manifests that, by all the parties to that charter, no such delay was foreseen.

"To obviate one of the inconveniences attending this delay, the suspension of the use of more than a moiety of the canal, now nearly completed, and to comply, if practicable, with the above limitation, the undersigned entered into a negotiation for the compromise of a part of their rights, with the adversary claimants; and, at one time, a prospect existed of accommodating the railroad and canal along the same shore of the Potomac, as far up the same as Harper's Ferry, though *not without considerable injury to the canal*, from the increased hazard to which its embankments were to be exposed, by being protruded into the bed of the river, and to both works from a reduction of their breadth: of that of the railroad, for near two miles out of the twelve below Harper's Ferry, to a space wide enough for two tracts only; and of the canal for the same distance, to a breadth much less than that hitherto prescribed for it, by a due regard to the facility of its navigation.

"An error has pervaded the public mind, which has its origin in the mere denomination of the controversy between the two companies. Its *commencement*, at the "Point of Rocks," has given rise to the common impression,

that the difficulties attendant on a joint construction of the two works exist at that place alone. But, in truth, the Point of Rocks, or the eastern base of the Catoctin mountain, where the two works first come in collision, is very far from presenting the most formidable of those numerous obstructions, which the shores of the Potomac oppose to the joint construction of a canal and railway along either bank of that river. These difficulties are so multiplied, and are so greatly augmented by the shape and structure of the Maryland shore above Harper's Ferry, as to cover a space of forty-five miles, and, in some cases, to become almost insuperable. So *they were represented to be* by the *very able engineers*, who twice surveyed, and concurrently reported a route along the northern shore of the river for the Chesapeake and Ohio canal, before the incorporation of the Railroad Company, or the remotest thought of constructing a railway and a canal, in juxtaposition, along that shore had been even dreamed of.

"The appeals which have been made to the undersigned, with seeming sincerity, to regard the work in which they are engaged, and on which they did not enter without due deliberation, as a *mere experiment*, till time shall have tested the relative utility of railroads and canals, they have been compelled to resist, for reasons which have been recently conveyed, by them, to another Legislature, in the form of a memorial; to a copy of which they beg leave here to invite the earnest attention of the committee of the House of Delegates of Maryland. It will be found in one of the printed pamphlets, herewith transmitted, and for the expected publication of which, among other causes of delay, this report has been kept back.

"The compromise by which it has been proposed to accommodate the subsisting controversy between the two companies, has failed, as has been intimated; and the accompanying correspondence will show. But, as its failure has been imputed to an unreasonable jealousy, of a rival enterprise, on the part of the undersigned, they beg leave to give, somewhat more in detail, those views of it, to which they have before adverted, but in a general way.

"The plan of the canal, prescribed by the unanimous resolution of the President and Directors, and approved by the stockholders of the Chesapeake and Ohio Canal Company, requires it to have, as far up the Potomac as Harper's Ferry, wherever practicable, without great additional cost, a breadth at the surface, of sixty feet at least; at bottom, of forty-two feet; with a depth of six feet water.

"This plan was adopted after much consideration, for reasons so fully explained and enforced in the first annual report of the President and Directors, that it is deemed unnecessary here to enlarge upon them. It may be said, however, that nothing has since occurred to change the opinion of the undersigned, in relation to the most expedient dimensions of this canal, or to warrant a reduction of those dimensions. One of the first objections, therefore, to the proposed compromise, arises from the reduction, which it requires, of the breadth of the canal, below sixty feet. This occurs for a mile and seven-eighths, or near two miles of the twelve, immediately below Harper's Ferry, and for the greater part, if not all, of the forty-five miles of difficult ground above the Blue Ridge. The second annual report of the President and Directors to the stockholders, states, explicitly, that along the entire line of forty-seven and three-fourths miles below "the Point of Rocks," the canal had been reduced below this breadth, at but very few places; in all, not exceeding in extent a single mile of that distance. This

benefit has been purchased at a cost not incommensurate, it is hoped, with its importance, but of no small amount; and, it is most obvious, that its value must depend, in no inconsiderable degree, on a preservation of the same dimensions above as below "the Point of Rocks."

"The terms of compromise which have failed, required the canal to give place to the railroad at four different places below Harper's Ferry, all occurring along rapid water, at the various falls of the Potomac, between the Point of Rocks and the Blue Ridge; and, in those places, the canal is to submit to a reduction of its breadth, from sixty to forty feet, or even less; for the danger to its banks may impose the necessity of reducing it below the breadth recently proposed by Messrs. Roberts and Knight. It is proposed, at these passes, amounting in extent to near two miles below Harper's Ferry, and to forty-five above, that the railroad shall occupy the firm ground on the land side of the canal, and that the canal, receding from the shore to give place to the former, shall occupy, with its reduced breadth, a larger portion of the bed of the river, where the river itself is hemmed in by rocky and precipitous cliffs. It is also a part of those terms, that the railroad and canal, conjointly constructed, shall be separated for those distances, by a space of but two feet, which is to be occupied by a low partition wall; and that, elsewhere, the canal and railway shall be apart not less than eight feet, if such be the pleasure of the Baltimore and Ohio Railroad Company. The open space beyond what is denominated the *berm* of the canal, is left for its breadth, to the discretion, not of both companies, but to that of the Baltimore and Ohio Railroad Company.

"To the reduced breadth which such a compromise must give to the canal, must be added, therefore, its increased cost, augmented hazard, and diminished utility. And first, its increased cost.

"As computed by the engineers of the two companies, this cost, when divided between the two works, amounts, on the reduced canal, exclusive of the time and money consumed in the conjoint location, to but a few thousand dollars; but experience has shown how little *mere estimates*, however carefully prepared, are to be trusted, no two engineers scarcely ever agreeing in them; and the same engineer, if he make successive surveys of the same work, not agreeing, in all cases, with himself.

"Moreover, the enhanced cost and almost insuperable difficulty of repairing such breaches as may happen in the canal, or any other injury to its various works, were enfiladed by the railroad, has not entered at all into the computation of the expense of its conjoint construction with the railroad. Yet, it cannot escape the slightest observation, that the materials for such repairs cannot be obtained from the Maryland shore, or employed after the completion of the railroad, without suspending its use, by resting them till worked up, on the margin of the canal, either in the carriages by which they may have been transported, or on the railroad itself, which occupies the ground next to the berm of the canal.

"As regards the additional hazard to which the canal will be exposed, by a compromise which protrudes it, at all the most rapid falls of the river, there bounded by lofty precipices thirty feet further into its rocky bed, it is impossible to measure it by any foresight, or to exclude it by any precaution. It must affect injuriously the original construction of the work, by exposing its embankments of earth to be swept away in their very formation. It must subject the navigation of the entire canal to great uncertainty, even after

those costly protection walls are added for its greater security from abrasion, as the experience of the Pennsylvania canals has lamentably demonstrated.

"How far such uncertainty may tend to destroy the use and profit of the canal, after it shall have been completed, it is not easy to predict; or how greatly the very work which requires this sacrifice, will profit by such exaction. This brings the undersigned to the third objection, that the proposed compromise will diminish the utility of the canal.

"So far as this may be effected by the actual suspension of its navigation; by breaches in its walls and embankments, where far protruded into the river, and by protracted labor in their necessary repairs, the undersigned have already briefly considered, in stating their first and second objections to the terms of compromise insisted upon by the Baltimore and Ohio Railroad Company.

"It remains, however, to notice and expose the very unequal benefits which the canal and railroad will derive from their juxtaposition.

"In narrow passes, the terms of compromise interpose a space of but two feet between the canal and railroad. In all other cases, they retain to the Baltimore Company the right to approach within eight feet of the berm side of the canal.

"The proper berm of the canal thus becomes, for forty-seven miles, a railroad, on which the company's cars, with or without locomotive steam engines, may be required daily, indeed hourly, to move, so as to leave no means of reaching the canal to the productions and manufactures of Maryland. The marble and lime of the adjacent hills and mountains; the lumber of the neighboring forests, a single piece of timber, or cord of firewood, cannot rest on or even near the berm of the canal, till a boat receives it, without impeding the use of the railroad. Nothing would be more easy than to obstruct along the entire line above the Point of Rocks, all intercourse with the canal across the road, where a sufficient space did not exist for turning a wagon, or erecting a warehouse for the storeage of commodities between the road and the canal. So that, while the boat lying next the berm of the canal might supply the railroad car with its lading, the railroad itself, enfilading the canal for its entire length, if the directors of the former shall so choose, will cut off the canal from half the territory on which it relies for its future commerce.

"But, in truth, the conjoint construction of those works, besides being too obvious a waste of the capital of one of them, to require comment, would be injurious to both, in robbing them of their proper breadth. In relation to the canal, which aims at reaching on the Ohio that market of the west which so many other competitors are also seeking with like avidity, such an imperfection of its structure would not only destroy the advantages hitherto imparted at great cost, to its navigation, by exposing its boats to unequal and increased resistance, but render the very end of its construction altogether insecure.

"And, with respect to the railroad, if limited to a space of thirty feet, twenty-two of which are required for two tracks only, it can never approximate to a perfect structure, and the principal benefits proposed to be derived from it, will unquestionably fail, while a rival enterprise provided with four tracks, and conducted along the opposite shore of the Potomac, or through some other of the numerous passes of the Alleghany, will draw from it all who consider accelerated motion a compensation for additional cost of

transportation. To such considerations as these, the jealousy now subsisting between the canal and railroad may blind the peculiar friends of the latter, till some other rival alike formidable, shall open their eyes, perhaps too late, to the danger of giving to their road a permanent breadth inconsistent with its future structure, on a more enlarged and perfect plan. To these considerations the Commonwealth of Maryland cannot be blinded, having an equal interest in both works. To her, it cannot be a matter of indifference that a compromise be made of the rights of the two companies virtually destructive of her interest in both, and of the very end of their incorporation.

"The undersigned confidently hope that an apology for having dwelt so long on this topic will be found in the sensibility with which the committee must regard the liberal contribution of their Commonwealth to both those costly enterprises."

"Respectfully submitted by order of the President and Directors of the Chesapeake and Ohio Canal Company.

C. F. MERCER,

President of the Chesapeake and Ohio Canal Company.

"*January* 31*st*, 1831."

ABSTRACT of Receipts and Expenditures on account of the Chesapeake and Ohio Canal Company, to the 3d day of January, 1833.

Dr. Cr.

To capital stock for amount of instalments paid to date, agreeably to returns received	-	$2,527,021 00		By requisitions paid and charged to contingent expenses of Chesapeake and Ohio Canal Company	$ 8,731 61	
Unclaimed dividends of the Potomac Co., received from the late Treasurer, for amount due sundry stockholders	-	366 30		Pay of officers	29,944 29	
Potomac Company received from the late treasurer	$ 131 87			Construction of the canal	2,170,789 02	
Do received from John Strider, for balance due by him	237 30			Engineer Department	95,000 59	
Do received from Jacob Payne, on account	36 18			Western section	4,026 08	
Do received for old iron sold	13 17			Stationery	1,328 75	
		418 52		Printing	5,387 94	
Toll account received to date	-	81,208 07		Postage	311 10	
Acquisition of lands received from Thomas C. Wright, for old houses condemned and sold	357 60			Acquisition of lands	112,383 04	
Do balance of money advanced, refunded	672 31			Law expenses	12,583 70	
		1,029 91		Potomac Company	7,352 34	
Profit and loss received for interest and gain on sales of Maryland stocks	-	4,703 03		Do unclaimed dividends	5 55	
Interest account received on judgments against delinquent stockholders	-	153 02		Interest account	2,738 70	
Law expenses received for cost of suit against delinquent stockholders	215 10					$2,450,582 71
Do balance of money advanced, refunded	80 00			Balances to the credit of the Chesapeake and Ohio Canal Company, in office Bank U. States, Washington	54,444 25	
Do received of Baltimore and Ohio Railroad Company, for costs of suit awarded in courts of Maryland	1,017 77			Bank of Washington	12,198 75	
		1,312 87		Bank of the Metropolis	12,547 08	
Construction of the canal, received for materials sold the penitentiary	82 20			Patriotic Bank	22,583 51	
Do received of G. H. Smoot, for rent of saw mill at the Great Falls	75 00			Bank of Alexandria	784 75	
		157 20		Bank of Potomac	18,436 42	
Engineer Department, received of Baltimore and Ohio Railroad Company, for costs of survey, awarded in courts of Maryland	-	2,500 24		Farmers' and Mechanic's Bank	46,350 73	
				Office Valley Bank, Charlestown	712 63	
				Do do Leesburg	109 50	
				Hagerstown Bank	119 83	
						168,287 45
		2,618,870 16				2,618,870 16

TREASURER'S OFFICE, CHESAPEAKE AND OHIO CANAL CO., *Georgetown, Jan.* 3, 1833.

C. SMITH, *Treasurer.*

CHESAPEAKE AND OHIO CANAL COMPANY.

The following address of Thomas Grahame, "to the Canal Proprietors, and the Traders on the Canals, in the line of the projected London and Birmingham Railway," should have been inserted entire as letter D, of this document, instead of the extracts printed at page 42.

GENTLEMEN: I have been led to address you in consequence of perusing a printed paper, entitled 'Summary of the Evidence led in Proof of the Preamble of the Bill for making the London and Birmingham Railway," circulated by the subscribers to the railway, who have appended to it a copy of the report, for the year 1831, of the directors of the Liverpool and Manchester Railway.

On considering this document, I observe that the revenue of the new projected railway is expected to arise from two sources; the first of which is the engrossing of the whole existing traffic on the turnpike roads, at present carried on by coaches, post carriages, vans, wagons, &c.

In the case of the Liverpool and Manchester Railway, all this trade has been taken from the turnpike roads connecting these two towns, and from the coachmasters, postmasters, and van and wagon carriers; and the whole is now centered in, and carried on by one joint stock partnership, the Liverpool and Manchester Railway Company, who are now the sole coach and postmasters, and van and wagon carriers between Liverpool and Manchester. The amount of the profits derived from these trades and occupations, now go to make up a dividend to the Liverpool and Manchester railway shareholders.

It is taken for granted that the same thing must take place on the turnpike road traffic between London and Birmingham; and although the London and Birmingham Railway is not like the Liverpool and Manchester Railway, six miles shorter, but is (including the distance to be traversed at each of its terminations) eight or nine miles longer than the turnpike road, this conclusion may be considered as a fair one; and it may be predicted that the whole, or a very large proportion of the coaching and carrying trades on the turnpike roads, now divided among such a variety of companies and establishments, must, on the opening of the London and Birmingham Railway, merge or fall into the hands of one great joint stock corporation, the London and Birmingham Railway Company. (Note A, Appendix.)

The second source from which the London and Birmingham Railway Company calculate to obtain their revenue, is by taking from the canal carriers engaged in the transport of light goods by what are called flyboats, a large amount of their trade, and by transferring the same to the Railway Company in their capacity of carriers.

How far this last calculation may prove correct seems to be extremely doubtful, for the canal conveyance to London is already far cheaper than

that on railways, and "the Liverpool and Manchester Railway Company, in their competition with the water carriage, have obtained but a very trifling proportion of traffic from the canals. The profits (if any have actually been made by the carriage of goods on the Liverpool and Manchester Railway) are extremely small; yet the water distance between Manchester and Liverpool is nearly double the railway distance; and instead of possessing the regularity of canal conveyance, is, for eighteen miles of this additional length, subject to the winds and tides of the Mersey. Nevertheless, of an amount of nearly fourteen hundred thousand tons annually, for the carriage of which the directors of the Liverpool Railway were desirous to provide, before their railway was opened, little more than an eighteenth part, including the entire road traffic, has been as yet obtained for the railway; and the expenses of carrying this fraction of the trade have been so enormous, as to make it doubtful whether the Railway Company do not suffer a regular loss on their carrying trade, which is defrayed from their profits as coachmasters." (Note B, Appendix.)

The question is one of great importance to the parties interested in the canals between London and Birmingham, as on the truth or falsity of the calculations of the promoters of the railway must depend the continuance of a considerable portion of the revenue of the canal proprietors, and the very existence of the trade or occupation of the canal flyboat carriers Unless the London and Birmingham Railway Company obtain possession, not only of the whole revenue or tolls paid to the trustees on the turnpike roads, with a portion of the canal tolls, and the entire income and profit of the carriers and coachmasters on these roads and canals, no return whatever could be obtained from their outlaid capital.

The Railway Company take it for granted that the canals are unable to enter into competition with them for the turnpike road traffic, the coaching, posting, van, and wagon trade, on which they expect to take from the road without dispute. They consider that the Canal Companies must stand merely on the defensive, until the Railway Company, having taken the road trade, begin the attack, and that then the canal carriers and company can only protect and preserve a part of their light goods trade, by a reduction of dues and charges, to compensate for the great rates of speed of the railway conveyance.

It is in order to enable you to change, entirely, this position of parties that I now address you; and I expect to make it clearly evident, that instead of being obliged to defend their present trade, the Canal Companies and the canal carriers may not only possess themselves of the whole van and wagon carrying trade now plying along the turnpike roads, but may obtain, also, a large portion of the coaching or passenger trade, and thus meet the railway on what was expected to be their undoubted and indisputable possession.

I am aware, that at present you believe it to be impossible, that in case a canal of nearly the same length as the Liverpool and Manchester Railway, could by any means be formed, connecting these towns, that it could take from the existing railway any considerable portion of the passenger trade, and it is likely that any statement in opposition to this belief, will generally be received with ridicule. The fact however, is, that supposing such a canal to be formed, and in operation, between Manchester and Liverpool, the railway coaching trade could not stand for a single month in competition with the canal passage boats; and this is the case, and will be the case, in

every canal where the proper means are adopted. For, however incredible it may appear, it is certain that canal passengers can be carried at a speed of ten miles an hour, with a degree of ease, comfort, and safety, such as no other conveyance can give, and at a charge (if required by competition,) not much more than a tenth of the cost of railway travelling.

These facts, so different from general belief, have only been completely ascertained during the course of the last two years. They are consequent on the detection, by practice and experience, of two fallacies which had been held out to the public, and received as undoubted truths.

The first of these fallacies was, that it was impossible to propel a boat, carrying any considerable number of passengers, along a canal at a high speed, without incurring an enormous expenditure of money and power, and without occasioning a wave or surge which would wash down the canal banks. (Note C, Appendix.)

The second fallacy was promulgated by certain engineers, connected with railway projects, and is as follows; viz: that in proportion as the speed on a railway was increased, the expense of conveyance was diminished, as the engines by doubling their speed could, in the same time, do double work. (Note C, Appendix.)

Now the first fallacy, viz: the alleged impossibility of moving at a great velocity through canals, and the certainty of the destruction of the canal banks by the swift passage of canal vessels, have been proved to exist in imagination only. A speed of ten miles an hour has for the last two years been maintained, in the carriage of passengers on one of the narrowest canals in Britain, without raising a ripple on the banks, even where the vessel carried upwards of one hundred passengers, or as many as are carried in a train of coaches on the Liverpool and Manchester Railway.

The expenses or cost of obtaining this speed are so trifling, that the fares per mile are, in these quick boats, just one half and one-third of the fares in the Liverpool Railway coaches, while at these low fares the profits are such as to have induced the boat proprietors to quadruple the number of boats on the canal.

On the other hand, and in respect of the second fallacy, although it be true that the extraordinary velocities obtained on the Liverpool railway have fully come up to the expectations of the projectors, yet the expenses, instead of being diminished, (according to the dicta promulgated by engineers,) have been enormously increased, and have gone so far beyond all previous calculation, as to make it doubtful whether the Railway Company will not ultimately find, that, agreeable to an Irish phrase, they have gained a loss.

It is sufficient here to say, that while the railway was forming, and before it was opened, the entire expenses of a locomotive engine working 312 days in the year, and doing three trips of thirty miles per day were stated, and indeed appeared to have been demonstrated to be £270 12*s*. 10*d*., or including a sum of £54 proposed to be laid aside every year for interest on capital invested, and replacement of engines employed, with allowance for spare engines, a sum of £324 12*s*. 10*d*. sterling; yet between errors in the calculation, and the effects of the quick speed, the bare cost of the above journeys has been increased to nearly £2,200 a year, and this large sum is the mere charge for fuel, repairs, and enginemen's wages, without any allowance for interest on capital expended on the engines, or for their replacement. (Note D, appendix.)

After making these statements, so contrary to general belief, it is proper that I should proceed to show distinctly the truth of what I have stated.

Two years have not yet elapsed since the opening of the Liverpool and Manchester railway, where the first experiments were made as to the effect of high velocity on railway conveyance. At this very period certain experimental boats were built for the purpose, and in the expectation of obtaining an increased speed in the conveyance of passengers on the Ardrossan, or as it is more generally called, the Paisley Canal. These two experiments, as regards high velocities on railways and canals were therefore begun and continued during the same period. The actual result of these experiments I shall now state.

As respects canals, the experiments of great velocity have been tried and proved on the narrowest, shallowest, and most curved canal in Scotland, viz., the Ardrossan or Paisley Canal, connecting the city of Glasgow with the town of Paisley and village of Johnstone, a distance of twelve miles. The result has disproved every previous theory as to the difficulty and expense of attaining great velocities on canals, and as to the danger of damage to the banks of canals by great velocity in moving vessels along them.

The ordinary speed for the conveyance of passengers on the Ardrossan canal, has, for nearly two years, been from nine to ten miles an hour; and although there are fourteen journeys along the canal per day, at this rapid speed, the banks of the canal have sustained no injury—indeed injury is impossible, as there is no surge. The boats are formed seventy feet in length, about five feet six inches broad, and, but for the extreme narrowness of the canal, might be made broader; they carry easily from seventy to eighty passengers, and when required, can, and have carried, upwards of 110 passengers. The entire cost of a boat and fittings up, is about £125. The hulls are formed of light iron plates and ribs, and the covering is of wood and light oiled cloth. They are more airy, light, and comfortable, than any coach; they permit the passengers to move about from the outer to the inner cabin, and the fares per mile are one penny in the first, and three farthings in the second cabin. The passengers are all carried under cover, having the privilege also of an uncovered space. These boats are drawn by two horses, (the prices of which may be from £50 to £60 per pair,) in stages of four miles in length, which are done in from twenty two to twenty-five minutes, including stoppages to let out and take in passengers, each set of horses doing three or four stages alternately each day. In fact, the boats are drawn through this narrow and shallow canal, at a velocity which many celebrated engineers had demonstrated, and which the public believed to be impossible. (Note E, appendix.)

The entire amount of the whole expenses of attendants and horses, and of running one of these boats four trips of twelve miles each, (the length of the canal,) or forty eight miles daily, including interest on the capital, and twenty per cent. laid aside, annually, for replacement of the boats, or loss on the capital therein invested, and a considerable sum laid aside for accidents and replacement of the horses, is £709, some odd shillings, or taking the number of working days to be 312, annually, something under £2 4*s.* 3*d.* per day, or about eleven pence per mile. The actual cost of carrying from eighty to one hundred persons a distance of thirty miles (the length of the Liverpool Railway,) at a velocity of nearly ten miles an hour, on the Paisley canal, one of the most curved, narrow, and shallow canals in

Britain, is, therefore, just £1 7*s.* 6*d.* sterling. Such are the facts, and incredible as they may appear, they are facts which no one who inquires, can possibly doubt. (Note F, appendix.)

As respects railways, the experiment of high velocities has been made, and the result ascertained on the best finished, and finest line of railway in Britain, connecting the two great towns of Liverpool and Manchester, without a single curve from end to end, and with only two short ascents.

The result of this experiment on the Liverpool railway has been somewhat different from that on the Ardrossan canal. On the railway, indeed, the expected velocities have been fully attained, and the calculations of the engineer, in this respect, satisfactorily demonstrated as possible and correct; but, unluckily, one very important matter had not been admitted into the calculation, or rather had not been supposed to exist, viz. the probability, or rather certainty, of a great increase of expense consequent on increased speed. The geometrical ratio of increased resistance on increasing the speed on canals, has been tranferred to the increase of expense on increasing the speed on railways, with this addition, that the increase of expense affects not merely the moving power, or locomotive engine, but the coaches, wagons, and roadway. The ordinary speed of conveyance on the Liverpool railway, is from ten to twenty miles an hour, and depends much on the weather and the weight dragged. The railway engine, with its tender for carrying coke and water, costs about £1,000, and drags after it a train of eight coaches, the cost of each of which, if the same as in the estimate for the London and Birmingham Railway, should be £200, or a train of first-class coaches, with accompanying engine and tender, costs £2,600. The coaches accommodate one hundred and twenty passengers. There are other coaches, and also uncovered wagons, which travel at an inferior speed, and which will cost less. The fares are various, seven shillings, or nearly threepence per mile for each passenger, in the best coaches, and five shillings, or twopence per mile, for each passenger in the common coaches, of what is called the "first train," being just double and triple the Paisley boat fares; and four shillings in the coaches, and three shillings and sixpence in the uncovered wagons, in what is called the "second train," which move at a lower velocity. The lowest railway fare to the traveller is, therefore, three halfpence per mile, in an open, uncovered wagon, moving at an inferior speed, exposed to wind and rain, and the steam and smoke of the engine; or double the fare on the Paisley canal, for being carried in a comfortable cabin under cover.

The exact cost of running the railway coaches cannot well be made out, as the expenditure is so blended in the railway accounts with other matters, that it is difficult to separate the appropriate items. The bare cost of fuel, repairs, and enginemen's wages, however, on each thirty mile trip of a locomotive engine, amounts, as appears by the Liverpool and Manchester railway accounts, to a sum of £2 5*s.* 3*d.*; while the cost of repairs and attendance alone, on each train of coaches going a thirty mile trip, is £1 8*s.* 7½*d.* Or the outlay on these two items of expenditure, alone, costs 2*s.* 7½*d.* per mile, or nearly triple the entire cost of running a Paisley canal boat a like distance. If the other items of expenditure are added, it will be found that the mere outlays per mile on the running of the Liverpool railway coaches, are not much inferior, if they be inferior at all, to the gross amount of the fares receivable from a passage boat on the Paisley canal, supposing it always to have (what is not possible) a full complement of passengers.

The above conclusion is fully established by the Liverpool and Manchester Railway report before-mentioned By this report it appears, that the average gross receipts from each passenger going along the Liverpool and Manchester Railway in the last six months of 1831, was four shillings and sixpense halfpenny, and that two shillings and one farthing of this sum was cost or outlay in the articles of coke, wages, repairs, and cost of keeping up the railway and establishment, but without any allowance for replacement of engines and coaches, or for returns on the capital invested therein, or for railway dues. It is stated in the accounts that 3d. $\frac{1}{8}$ of this outlay is paid for the use of Omnibuses to each passenger, which, if correct, makes the cost of carrying each passenger thirty miles, to be one shilling and ninepense $\frac{1}{2}$, or as nearly as possible, three farthings per mile, which is just the full fare levied from five-sixths of the passengers on the Paisley Canal. In other words, the Paisley Canal Company make a large profit on fares, which would not pay the mere outlays on the railway conveyance. (Note D, and G, Appendix.)

The Paisley Canal boats have now been at work plying on that canal, since the autumn of 1830, and it is found that they are as easily and safely drawn at the high velocities before mentioned, during the night as during the day. The accidents on the Liverpool Railway have been so frequent, and so serious, as to require the notice of the Directors in the reports; whilst not even the semblance of an accident has happened with the Paisley boats. When plying in the dark, the only precaution necessary is, on account of the boy riding and directing the horses. In passing under the bridges, over the canal, a light to direct him is opened by the man at the bow of the boat, and thrown on the bridge so as to guide the boy, and this light is shut up as soon as the bridge is passed.

The accommodation to intermediate passengers, by these boats, is very great; they are so light and so easily drawn, that they have (what is termed) little way, and stop almost as soon as the horses cease to pull, while, from the lightness and shallow draught of water of the boats, the velocity can be easily and suddenly regained.

If the trains of coaches on the Liverpool Railway were like the Paisley Canal boats, stopped every mile or two for the accommodation of intermediate passengers, they would not be able, from the time lost in first reducing, and afterwards raising their speed, to go as fast as these improved canal boats.

This easy power of stoppage, and of travelling during the night, is, independent of cheapness, a most formidable power to canals in obtaining the carriage of passengers, and, if properly employed, will more than put them on a par with railways in the competition for the passenger trade. Intermediate passengers, on most routes, give nearly one-half of the returns; and it is impossible for a railway to accommodate this intermediate trade without sacrificing its only advantage of superior speed.

The passage of locks in canals, and the delay consequent on such passage, will, no doubt, be an obstruction and disadvantage to many canals; but, by proper arrangements, this disadvantage may be got over. The locks where it answers, may be the places at which horses are changed, or for receiving or landing passengers. And were they occur in the middle of a stage, they will be a short relief to the horses, so that a higher speed may be kept up before and after leaving the locks. Where a series of locks occur at one place, the time occupied may be employed in obtaining refresh-

ment, or taking breakfast or dinner. There are no locks on the Ardrossan or Paisley Canal, but in two of the stages it is for a considerable distance so narrow, that two boats cannot pass. At these places, (when the boat is fully loaded,) the speed is slackened to between four and five miles an hour; the time is afterwards made up on the wider parts of the canal. The entire length of these narrow places extends to fully a twelfth of the whole length of the canal.

Such are the improvements which have been effected on the Ardrossan or Paisley canal, so far as regards high velocity; and they may be followed out in every canal, so as not merely to defend the present established canal revenue, but to obtain a new and great additional revenue. (Note G, Appendix.)

Although I have principally confined myself to the article of passengers, yet all I have stated applies equally to the light goods now sent by the road wagons and vans.

With two horses, it has been shown, that a weight equal to nearly eight tons in passengers, may be conveyed along a narrow and shallow canal, at a rate of nine or ten miles an hour, and at an expense of 11d. a mile, including every outlay, with interest and replacement of capital, being less than one third of the bare cost for conveyance of a similar weight on a railway.

To enter into any further detail as to the superior cheapness of the conveyance of light goods by the new improved boats on canals, over the conveyance by railways is unnecessary. For if in the passenger trade, (in which branch of conveyance railways are considered to be invincible,) the improved boat possess such advantages over railways, it is clear that these advantages in the carriage of light goods are still more decisive. The absolute outlay or cost of conveyance of a ton of goods between Liverpool and Manchester, (by the railway accounts,) is upwards of 8s., or between 3d. and 4d. per mile, without any allowance for the annual deterioration of the vast sum laid out in wagons, engines, machinery, &c., for enabling the railway company to prosecute the carrying trade, and without any allowance of interest on that capital, or on the sum laid out on the railway.

But these goods could be carred along a canal at nearly the same speed, and at a cost of about one penny farthing per ton per mile, including in this sum a liberal allowance for interest and replacement of capital; thus leaving a sum of from 2d. to 3d. per mile to meet the expenses of delivery, canal dues, and carriers' profit, while the entire charge would be still within the outlaid expenses on a railway.

I know well that the amount of articles requiring a dispatch of eight or ten miles an hour, or rather which can afford to pay any additional charge for conveyance at this speed, is very trifling; but if the statements in the summary of evidence as to the London and Birmingham railway be correct, there is at present a considerable traffic in light goods by vans and wagons on the turnpike roads in the line of your canals; if so, you must not permit a rival to possess himself of this trade, and to use the revenue of it as a mean to keep up the rival establishment. By conjoining in boats on the improved constructions, the carriage of the light goods, now going by vans or wagons and coaches, with a night passenger trade, a very lucrative branch of business may be reared up for your navigations, with light boats, carrying from thirty to forty passengers, and from four to five tons of goods, all the turnpike, van, and carrying trades may be taken by the canals, and all travellers, to whom money and time are of moment, will

prefer this night route. The ease of motion of the boats is such as to prevent all fatigue, and by a limitation in the number of passengers, the accommodation may be as comfortable as a bed or sofa.

Every one who has seen the various improvements introduced and introducing into the construction of the light gig-shaped boats, must be sensible that this matter is in its infancy. The comfort and airiness of the latter made boats is most striking; and the introduction of a hollow keel will enable them to be made much flatter midships, so as to make them more easily tracked. That farther improvements may be introduced, I make no doubt, and when it is considered that the entire improvements already stated, have originated with, and have been brought into full effect by one individual,* (who was previously unacquainted entirely with boats or boat building,) the field of improvement seems sufficiently open. To his talents and perseverance canal companies and canal carriers are deeply indebted, and I am convinced nothing would afford greater pleasure than to see his improvements carried forward and surpassed.

I shall make only one further reference to the Liverpool and Manchester railway report, and state, that it thereby appears, that such is the value set on money as compared to time, that a large proportion of the passengers on that railway prefer to travel by the open uncovered wagons at a greatly reduced speed, and without the accommodation of an Omnibus at each extremity to convey them to their destination, in order to save one shilling and sixpence. In other words, the saving of two hours of time, and a walk of nearly three miles, was not worth to them an outlay of eighteen pence. The same result must take place in the contest between your passage boats and the railway carriages, with this difference in your favor, that the second cabin of one of the boats at a fare of three farthings per mile, will be more agreeable, and much safer than a railway coach of the first order, at a fare of three pence per mile. In all night travelling, provided the vehicle is noiseless and easy in motion, time is not taken into account in distances which can be accomplished between eight or nine at night, and seven or eight in the morning. The railway coaches cannot travel at night, and if they could, their only advantage of speed would be lost between the principal points of the journey.

I need not call your attention to the improvements by lengthening locks, improving curves, avoiding circuits, &c. which you may make on the passage along your canals. If the breadth and the curves in the Paisley canal permitted their boats to be made ninety feet instead of seventy feet in length, the passage boats would carry nearly a half more passengers without increase of expense, the labor of the horses would be diminished. (Note H, appendix.)

Many of these improvements must depend for execution, on the consent of the adjacent landed proprietors, and which it would be clearly their interest to grant. The improved communication is a general benefit to the country, and a very particular one to those districts to which the improved water conveyance may be extended, and particularly beneficial to the agricultural and working classes, by affording employment to the one, and a market for the produce of the other class.

The merits of the improved conveyance are not like all late improvements, a mean of superseding animal labor or power, but consist in an improved and extended application of that power. The country obtains here-

*William Houston, Esq., J hnstone Castle.

by all the benefits of the cheaper and improved travelling and communication, while the change is productive of not even a temporary inconvenience to the raisers of food, or to the laboring classes who consume it. It does not consist in the substitution of a small number of machines to supersede the work of many thousands of men and horses, but the improvement consists in enabling these men and horses to exceed and supersede the power of machines.

APPENDIX—Note A.

I know the turnpike road coachmasters say they are able to carry nearly as cheap as the railway, but though they could, the enormous capital, and the credit and power to borrow or create stock, which the railway corporation possess, must make rivalry with them ruinous, if not impossible By the statement of Mr. Booth, the Secretary to the Liverpool and Manchester railway, it appears that the expenditure in the formation of the railway and works, or as it is termed, the capital account, on the 31st May, 1830, was £739,165 5*s.* 0*d.*, and at this time the railway was nearly completed, and was opened four months after for general trade. This expenditure of £700,000 occupied a period of four years. By the account appended to the "summary of evidence of the London and Birmingham railway," it appears that the expenditure on account of the Liverpool and Manchester railway and works, amounted on the 31st December, 1831, to a sum of nearly £992,054 3*s.* 6*d.*, so that the expenditure on the capital account from 31st May, 1820, to 31st December, 1831, amounted to £252,888 18*s.* 6*d.* The expenditure on the capital account has therefore continued as high after the railway was opened, as during the period it was constructing. In addition, an act has been obtained this year authorising the company to borrow £100,000 additional, to make a tunnel for the coaching trade. A company thus incorporated, may at once ruin a rival, by increasing their stock without touching their divided.

Note B.

The entire trade contemplated by the Directors previous to the railway being opened, and for which they wished to provide means of conveyance between Liverpool and Manchester, was 1,248,000 tons; but the entire amount obtained in the year 1831, was 88,099 tons, of which, 52,224 tons was carried in the last six months of 1831. The expense of carriage of these 52,224 tons, was £21,841 4*s.* 10*d.*, so that if the entire amount of anticipated trade on the railway had been obtained, the actual annual outlay on the goods trade alone, would have amounted to nearly £500,000 sterling, besides all the coaching disbursements, a sum far beyond the original estimated cost of the railway itself.

Note C.

The last scientific work I am aware of, in which these fallacies, propositions, or data, are demonstrated to be true, is Mr. Wood of Killingworth's book on railways. This book was re-published about six months after the

Liverpool railway was opened; and it is there demonstrated that it would take upwards of seventy horses to do on a canal what is now actually done every day on the Paisley canal, by two horses; while it is in like manner demonstrated that the conveyance on the Liverpool railway was costing one-ninth of the amount, which, at the end of the year, it was found to have done.

Note D.

Previous to the opening of the Liverpool railway, Messrs. Stephenson and Lock, engineers on the railway, judging from various trails and experiments made on the railroad, calculated the expense of an engine doing nine hundred and thirty-six trips yearly, or three trips per day, at the rate of fifteen miles per hour, dragging a dead weight of about thirty tons, at £324 12*s.* 10*d.* including a sum of £54 laid aside each year for replacement of engine and interest on cost;—or the cost of the motive power of each trip was calculated by them at a sum something under six shillings and sixpence.

It does not appear by the Liverpool and Manchester railway reports, what number of engines they had in employment during the year 1831, but this is of little importance, as the number of thirty mile trips performed by these engines is specially stated, with the cost of these trips, and this cost includes merely the price of coke consumed, the cost of repairs, and enginemen's wages, without any allowance whatever for interest of capital or replacement of the machines themselves. Now, the exact number of thirty mile trips made by the Liverpool railway engines in the last six months of the year 1831, was 5392, of which 2944 were with coaches and passengers, the gross weight dragged not exceeding fourteen tons. The expense or cost of these 5392 trips, for coke, wages and repairs alone, (allowing nothing for replacement,) was £12,203 5*s.* 6*d.* or a little above £2 5*s.* 3*d.* per trip; or the bare cost of an engine doing nine hundred and thirty-six trips was £2,107 14*s.* instead of £270 12*s.* 10*d.*

Note E.

The Paisley canal passage boats are formed very much like the common race gig. This form was suggested by William Houston, esq. of Johnstone, who made an experiment with a common race gig boat, in spring, 1830. He found that with a single horse, this boat, with twelve men on board, could be drawn through the Paisley canal at the rate of twelve miles per hour. The first boat for passengers, built in consequence of this experiment, was made of wood, and the only difficulty in her management, was the labor to the horses in carrying her round the curves in the canal. This difficulty, at Mr. Houston's suggestion, was removed by doing away with the dead wood behind, and attaching a deep midships keel. By this alteration the boats steer most beautifully, and the labor of the horses at the curves is made quite easy. The hulls of all the boats since the first, have been made of iron, the plates of a 16th wire gauge. This makes them very light, and much stronger than a wooden boat, and two years' trial had shown their perfect safety, in spite of all the doubts and objections started, when I first proposed their use. The plans of the boats were made out by Mr. John Wood, shipbuilder, Port Glasgow. Description, however, will not do: let parties wishing information as to these boats, come and see their performance.

Note F.

COST OF COACHES.

In the Liverpool railway account of expenditure, for the last six months of 1831, the charges for repairs and attendance on the Liverpool railway coaches, is stated at £7455 1*s.* 1*d.* sterling, of which, 3*d.* $\frac{1}{8}$, per passenger, or £3254 0*s.* 0*d* $\frac{5}{8}$, is stated as being paid for Omnibus accommodation. This leaves £4,201 0*s.* 0*d.* $\frac{3}{8}$ sterling, as the cost of repairs and attendance, and the number of thirty mile trips, being, per the report 2844, the cost on each trip was £1 8*s.* 7$\frac{1}{2}$*d.* sterling.

Note G.

State of time occupied on two voyages from Johnstone to Glasgow, June, 1832.

FIRST VOYAGE.

1832.

June 16.—Left Johnstone 28 minutes from 3 o'clock P. M. met no boats—diminished speed to about 4 miles an hour in narrows, for about half a mile from Paisley—arrived at Paisley 5 mintes to 3—

			HOUR	MIN.
Time, - - - - - -			0	23
Stopt at principal Basin, Paisley, -	0	8	0	11
at Coal Wharf beyond, - -	0	3		
Arrived at Glasgow a few seconds from 4—met five loaded boats and a passage boat between Paisley and Glasgow, lost upwards of a minute and a half at aqueduct over river cart, which a boat entered before us, and where the canal is too narrow for two boats to pass. Stopt once to change horses, and then to let out or take in passengers, time			0	54
			1	28
Time on journey, including stops, except at Paisley, - - -	1	17	1	28
at Paisley, - - -	0	11		

SECOND VOYAGE.

1832.

			HOUR.	MIN.
June 28.—Left Johnstone 29 minutes past 2 o'clock, P. M., arrived at Paisley 7 minutes to 3; no stops, except for half mile at entering Paisley, where, as usual, boat was slowed,			0	24
Stop at principal basin, - - -	0	9	0	12
at Coal basin, - - -	0	3		
Arrived at Glasgow at four minutes from 4, P. M.—met three loaded boats and passage boat—stopt twice for letting in and out passengers, and once to change horses,			0	15
			1	27
Time on journey, including stops, except at Paisley, - - - - -	1	15	1	27
at Paisley, - - -	0	12		

The stop at Paisley is stated separately, as it would be on any other journey useless. Paisley furnishes almost all the passengers, both for and from Glasgow and Johnstone.

Note H.

The builders of the Paisley boats have just finished and launched a passage boat, on the same principle, on the Monkland canal. She is eighty-five feet long, seven feet six inches broad, and can, with perfect ease, carry upwards of 120 passengers. She was built at Paisley, by Messrs. Reid and Hannah; carried on a truck to Johnstone, where she was fitted up by Mr. Boag, and thence carried on a truck, fully sixteen miles, and launched in the Monkland canal, where she gives the highest satisfaction.

With great submission to the learned men who have experimented and written on the subject of the resistance to bodies moving at various velocities on the surface of the water, it would appear, that little certain knowledge has yet been attained in the matter. Independent of the simple resistance of the water, to its being divided or thrown aside by the moving body, which might (if it could be preserved unmixed with other causes of resistance) be measured and ascertained, there are causes of obstruction or resistance excited or brought into action, by the mere motion of the advancing body, which are constantly varying in amount and effect, and which thus render all experiments as to the actual resistance of the water and its increase, quite uncertain. The variations in these sources of resistance are so great, that while at certain velocities (very high or very low velocities) they hardly appear to exist or to produce any effect, at certain other velocities they would appear to be greater obstructions than the actual resistance of the water to being cut or divided. If these subsidiary causes ever totally disappear, it is at very high velocities, and I am inclined to think, that at these velocities they do disappear, but this disappearance is uncertain; it is well ascertained, however, that though not very perceptible, they may be observed at very low velocities. The approach of a slow coal boat is perceptible in a canal a mile and upwards before it comes forward.

My meaning will be best explained by a reference to facts verified by the Paisley canal passage boats, when moving along that canal. When started at a low velocity, these boats move apparently through the smooth surface of the canal, meeting with no resistance other than that of a very small part of the fluid which they intersect. If, in addition to this resistance, they are burthened with the obstruction of a small body of water carried on before, it is not perceptible. Let the speed be increased, and a body of water rises in front of the boat, preceding it at various distances dependant on the velocity of the boat, and increased, by degrees, till it rises to eighteen inches, and two feet, flowing over the banks of the canal, and occasioning such a resistance, that the horses dragging the boat would, if it was allowed to continue, be unable to proceed for any length. If, however, the speed is further increased, the boat advances to, and passes the wave, which subsides behind, and the water in the canal becomes again perfectly still, the horses become then fully able for their work, and the boat appears to meet little resistance other than occasioned by cutting or passing through the water. Whether in this last case the vessel still continues to carry a body

of water, in front, is uncertain, but if such be the case it is imperceptible; and the higher the velocity, it would appear, from the increasing quiescence of the water, the more is the resistance to the moving body reduced to the mere resistance offered to the cutting of the water. So sensible are the masters of the Paisley canal passage boats of the destructive effect of this wave before the boat, and in obstructing its motion and overcoming the power of the horses, that when, by the carelessness of the drivers, a wave is allowed to rise, the boats are stopped and again started, as it is found to be much easier to bring the boat up to the high from the low speed, without raising the wave, than to force the boat over the wave when once it has been raised. In like manner, when the boat is moving at the rate of nine or ten miles an hour through the canal, if the horses are suddenly stopt, the wave appears as the speed decreases, and washes over the banks until the onward motion of the boat falls to the low velocities first mentioned.

Now, two very opposite conclusions might be drawn by persons observing these facts. One person beginning with the high velocity, and observing the increase of labor to the horses on decreasing that velocity, might be apt to imagine that not only the resistance increased with the diminished speed, but that, at the diminished speed, a wave, destructive to the canal banks, was raised. Another party, again, observing the increased resistance and wave consequent on increasing the speed of the boat beyond the low velocity, might at once lay down opposite rules and conclusions.

Until some mode of measuring the effect of this wave in increasing the resistance is ascertained, it would appear to be difficult to say what is the real increase of resistance in passing along the surface of a piece of water. The fact is undoubted, that two horses on the Paisley canal boats, drag with ease a passage boat with her complement of seventy-five or ninety passengers, at the rate of ten miles an hour, along the canal, while it would kill them, or even double the number of horses, if they attempted to drag that boat along the canal at the rate of six miles an hour. It would be much easier to draw the boat along the canal at the rate of fifteen miles an hour, than at the lower velocity of six miles. The facts now stated, though more decidedly exhibited in the Paisley canal, from its narrowness, have been proved and exhibited on various others canals, and must, though in different degrees, affect motion along all bodies of water.

They afford great encouragement to canal companies, in their endeavors to improve the speed on their canals. I have been dragged, by one horse, in a common gig boat, with five or six other persons, for two miles, along a canal, at the rate of fifteen miles per hour; and this speed was not limited by the labor of the draught, but by the power of speed of the horse. A high degree of speed is safer both for the light boat and the canal works, than a speed of five miles an hour with a common heavy boat, as the light boat carries little way, or momentum, and might be dragged at the above high velocity to the very entry of a lock, and would have her speed reduced before she was fully into it, so that there is no danger to the gates.

I have also performed a voyage of fifty-six miles, along two canals, including the descent of four, and the ascent of eleven locks, the passage of eighteen drawbridges, where the line was thrown off, and sixty common bridges, and a tunnel half a mile long, in six hours thirty-eight minutes. The boat was of a twin shape, sixty-nine feet long and nine feet broad, and was drawn in stages by two horses each stage, and carried thirty-three passengers with their luggage and attendants.

THOMAS GRAHAME.

Glasgow.

23d Congress, 1st Session. [Rep. No. 414.] Ho. of Reps.

CHESAPEAKE AND OHIO CANAL.

[To accompany bill H. R. No. 94.]

April 17, 1834.

Mr. Mercer, from the Committee on Roads and Canals, made the following

REPORT:

The Committee on Roads and Canals, to which, were referred the memorials of the Chesapeake and Ohio Canal, and of the Baltimore and Ohio Railroad Companies, as well as numerous petitions from the inhabitants of Virginia, Maryland, and Pennsylvania, praying for an additional subscription, by the United States, to the capital stock of the Chesapeake and Ohio canal, report, in part:

That, prior to their concurrence in favor of the bill now before the House of Representatives, authorizing a further subscription of ten thousand shares to the stock of the Chesapeake and Ohio canal, oral statements were made to them of the progress and present condition of the affairs of the Chesapeake and Ohio Canal Company; which they were assured, would be officially verified by written returns, then expected, from the engineers of the company, of the actual state of the various works on the canal, involving minute details of their cost, and the manner of their construction.

These details, coming down to the 1st of April, 1834, it is the purpose of this report to communicate to the House, along with the considerations which prompted the committee to recommend the proposed subscription.

For the better comprehension of the nature and importance of the enterprise, to which they relate, and of the origin of the subscription to its stock, already made by the Government of the United States, the committee deem it expedient, to premise a history of the Chesapeake and Ohio canal.

The current belief, that an easy communication, *by means of a short portage over land*, could be effected between the Potomac and Ohio, and, consequently, between all the Eastern and Western waters of the United States, existed long prior to their union, under one independent government. As early as the year 1749, a land and trading association, composed of some of the most opulent and respectable inhabitants of the colonies of Virginia and Maryland, had purchased a large tract of country of the Indians, and, under the title of "The Ohio Company," constructed a warehouse, for the reception of goods, at Fort, now the town of Cumberland, on the left bank of the Potomac. By means of the Indian paths

[Gales & Seaton, print.]

across the intervening mountains, they carried on an extensive traffic with the various savage tribes on the waters of the Monongahela, the Youghiogeny, and the Ohio.

Their goods, imported from Great Britain, then the mother country, into the town of Belhaven, now called Alexandria, were carried eighteen miles over land, to the head of the Great Falls of Potomac, and there transferred to barges, from which, they were relanded, at Cumberland, after a voyage of one hundred and seventy-six miles. In the year 1755, the unfortunate General Braddock, after debarking a British army at Belhaven, and marching to the head of the Great Falls, ascended the river Potomac to Fort Cumberland; whence, he constructed the first carriage-way across the Alleghany, a road still bearing his name.

The natural condition of the navigation of the Potomac is minutely described in certain printed proposals, for its improvement, published in the city of London, in February, 1773; while Doctor Benjamin Franklin and Governor Pownall, along with Thomas Walpole, Samuel Wharton, and other English gentlemen of influence, were endeavoring, with a prospect of success, to prevail on the British Crown to establish a new province, west of the Alleghany, upon the waters of the Great Kenhawa and Monongahela. Printed copies of these proposals are still to be found among the papers of the last agent of the Ohio Company. That they attracted the notice of General George Washington, one of whose ancestors, the proprietor of Mount Vernon, was a member of that company, is manifest from an endorsement, in his hand, on a copy of them originally filed among the records of the Potomac Company. The cares and perils of the revolution, in which he laid the foundation of the independence and freedom of his country, had scarcely passed, when he invited the attention of Maryland and Virginia to the improvement of the navigation of the Potomac, and its connexion, by short portages, across the intervening mountains, with the navigable waters of the Cheat, the Monongahela, and the Youghiogeny rivers. His accurate knowledge of a country, in the military protection of which, from savage incursion, he had been engaged for several years, combined with the intimate acquaintance which he subsequently formed, while acting on a more extended theatre, with all the other practicable channels of communication between the Eastern and Western waters, induced him to pronounce the opinion, that the portage, which he proposed to effect, between the Potomac and some of the head waters of the Ohio, combined with the improvement of their navigation, would prove the shortest, cheapest, and, consequently, the best connexion that could be formed, between the Atlantic and the Western Territory of the United States. Accordingly, at a meeting of commissioners, on behalf of the States of Virginia and Maryland, held at Annapolis on the 22d of December, 1784, at which he presided, he laid the foundation of the charter of the late Potomac Company; to the capital stock of which, both States liberally subscribed. The joint act of incorporation stated its object to be "the extension of the navigation of Potomac river, from tide water, to the highest place practicable on the North Branch:" and the fourth section of the act, for the attainment of this purpose, authorized the President and Directors of the Company "to construct canals, and erect such locks, and perform such other works, as they may judge necessary, for opening, improving, and extending the navigation of the river, above tide water."

To the very limited knowledge of the science and practice of civil en-

gineering, existing in the United States at that early period, and to the yet more limited resources of a people impoverished by a long continued war for their independence, is to be ascribed, the ultimate failure of the Potomac Company to realize the wise and patriotic views which gave it birth. The mode of improvement which the company adopted, was found, after much experience, to be radically defective. The labor of more than forty years, and the expenditure of more than seven hundred thousand dollars, including all their tolls, except a single dividend of four per cent., left the *ascending* navigation of the Potomac, at all seasons, as laborious and expensive as the use of the adjacent turnpike roads; while the *descending* navigation continued to be, as it had been prior to any improvement of the bed of the river, totally suspended, during the far greater part of every year, for want of a sufficient depth of water.

To collect a part of this shoal water, and conduct it along the same valley, in a continuous canal of sufficient breadth and depth for the purpose of easy and constant navigation, offered the best, if not the only adequate remedy for this natural defect; and accordingly, the board of public works of Virginia, a few years after their incorporation, directed their principal engineer, in compliance with a resolution of the General Assembly of the 8th of January, 1820, to "examine the waters of the Potomac above the upper line of the District of Columbia; and to explore the country between the Potomac and Ohio, on the one side, and the Potomac and Rappahannock on the other, with a view to ascertain and report upon the practicability of effecting a communication, by canal, between the three rivers." The result of this survey was communicated by the Governor, the ex officio President of the Board, in a report to the General Assembly of Virginia, in December, 1820.

The practicability of uniting the navigable waters of the Potomac with the Ohio, by one continued canal, was then, for the first time, publicly affirmed and demonstrated. The report of Thomas Moore minutely described both *the route*, and the *mode of effecting* such a connexion.

Attracting the attention of a sister State, this report was followed, early in 1821, by the appointment of four commissioners, on the part of Virginia and Maryland, "jointly to examine the affairs of the Potomac Company, the state of the navigation of the river Potomac, and its susceptibility of improvement; and to make report whether the company had complied with the terms of its charter; if not, its ability so to comply, within a reasonable time; and whether any, and what aid should be given to the company; and what would be the best means of effecting an improvement in the navigation of the river."

The commissioners were empowered to call to their aid suitable engineers; and they, accordingly, associated Isaac Briggs of Maryland, with Thomas Moore, in making their examinations, surveys, and estimates. Their concurrent report confirmed, in the most important particulars, that which had been separately made by the principal engineer of Virginia; and was transmitted, by the commissioners, to their respective Executives; and, by them, to their Legislatures, in January 1823.

Prior to this date, however, legislative action, on this subject, had been begun in Congress, by a report of a committee, presented on the 3d of May, 1822, to the House of Representatives, in relation to sundry memorials of the citizens of Pennsylvania, Maryland, and Virginia, requesting the pecuniary aid of the United States, to enable the Potomac Company further to improve the navigation of that river.

The report not only sanctioned the object of the memorialists, but adopted, and recommended to the attention of the House, the suggestion of the General Assembly and of the chief engineer of Virginia, to extend the contemplated improvement. westwardly, to the navigable waters of the Ohio.

In the following winter, separate acts, to incorporate a joint stock association, entitled "the Potomac *Canal* Company," were passed by the Legislatures of Maryland and Virginia, with the unanimous assent and approbation of the Potomac Company, expressed by their resolution of the 3d of February, 1823, "to surrender their charter," upon liberal conditions, to any company that might be incorporated, for the purpose of extending a canal, along the valley of the river, towards the base of the Alleghany. These acts proved, however, abortive. They disagreed in some of their provisions, and omitted any reference whatever, to the necessary co-operation of the United States, in the proposed work, as the exclusive sovereign of the District of Columbia, in which all the market towns of the Potomac are situated, and the canal was to find its eastern termination.

To *unite* the counsels of the friends of the proposed improvement, and to devise, at the same time, the best *practical means of extending its object*, to a union of the Potomac with the Ohio, and of both with Lake Erie, a public meeting, held on the 25th day of August, 1823, in the town of Leesburg, in Virginia, through a committee of their body, invited their fellow-citizens of that State, and of the adjacent States of Maryland, Pennsylvania, and Ohio, and the District of Columbia, to depute representatives to a convention for the above purpose, to be held in the city of Washington on the 6th of November following. (See App. A.)

Pursuant to this invitation, a numerous assembly of delegates chosen by the citizens of those States, and of the cities and counties of the District of Columbia, met on the appointed day, in the Capitol of the United States, and by a series of resolutions, adopted with extraordinary unanimity, concerted a plan for the attainment of their common object, the execution of which they confided, on their adjournment, to a standing "central committee" of their body. The same convention, enlarged by the choice of other delegates, reassembled in the same city, on the 6th of December, 1826, on the invitation and notice of their central committee, and closed a session of three days in the hall of the House of Representatives, after having passed various resolutions, enlarging the number, and extending the powers of their standing committee. (App. B.)

In allusion to the first assemblage of this convention, the President of the United States, in his annual message, delivered on the 3d of December, 1823, at the opening of the first session of the eighteenth Congress, recommended their object in the following impressive language: "Many patriotic and enlightened citizens," says Mr. Monroe, "who have made this subject an object of particular investigation, are of opinion that the waters of the Chesapeake and Ohio may be connected together by one continued canal, and at an expense far short of the value and importance of the object to be obtained. If this could be accomplished, it is impossible to calculate the beneficial consequences which would result from it. A great portion of the produce of the very fertile country through which it would pass, would find a market through that channel. Troops might be moved with great facility in war, with cannon and every kind of munition, in either direction. Connecting the Atlantic with the Western country, n a line passing through the seat of the National Government, it would

contribute essentially to strengthen the bond of union itself. Believing, as I do, that Congress possess the right to appropriate money for such a national object, (the jurisdiction remaining to the States through which the canal would pass,) I submit it to your consideration whether it may not be advisable to authorize, by an adequate appropriation, the employment of a suitable number of the officers of the corps of engineers to examine the *unexplored* ground, during the next season, and to report their opinion thereon. It will likewise be proper to extend their examination to the several routes through which the waters of the Ohio may be connected, by canals, with those of Lake Erie." The President thus embraced in his annual message the entire purpose of the Washington convention; and, doubtless, laid the foundation of the subsequent act of the same session of Congress, authorizing the Executive to cause to be procured the necessary surveys, plans, and estimates of such roads and canals as he might deem expedient, "with a view to the transportation of the mail, the commercial intercourse, and military defence of the United States."

The central committee of the convention, shortly after their appointment, transmitted copies of a bill to incorporate the Chesapeake and Ohio Canal Company, to the Legislatures of Virginia, Maryland, and Pennsylvania, deferring a similar application, to Congress, until the States of Virginia and Maryland, without whose concurrence nothing could be effected, should have agreed on the terms of the proposed charter.

The Virginia act of incorporation bears date the 27th of January, 1824; that of Maryland one year after, having been passed during the session of her Legislature which began in December, 1824. Both acts were promptly confirmed by one of Congress, approved on the 3d of March, 1825. After twice rejecting the application of the central committee, Pennsylvania passed an act of similar tenor in all respects, except that her concurrence was coupled with certain conditions, on the 9th of February, 1826, when, with this exception, the charter became complete.

The preamble of the charter recites that its purpose is "to establish a connected navigation between the Eastern and Western waters, so as to extend and multiply the means and facilities of internal commerce and personal intercourse between the two great sections of the United States, and to interweave more closely all the mutual interests and affections that are calculated to perpetuate the vital principles of union." The following sections of the act propose to accomplish this laudable purpose, by constructing "a navigable canal from the tide water of the Potomac, in the District of Columbia," along the valley of that river, and across the Alleghany, "to some convenient point on the waters of the Ohio, or of some one of its tributary streams."

To avoid popular objections to tunnelling the mountain, an amendment of the original act of incorporation authorizes the connexion of those rivers by a *railway*, or a *canal*, as might be found most expedient. The charter divides the whole line of canal into two sections, denominated, respectively, eastern and western. It terminates the former in the valley of the Potomac; and provides that the latter may intersect that river, either at Cumberland, or at the mouth of Savage creek. It requires the breadth of the canal to be not less than forty, and its depth to be not less than four feet. Allowing two years from the organization of the Canal Company for its commencement, twelve more are allowed, from the date of its commencement, for the completion of its *eastern section;* and, after its completion,

two years are given, for beginning, and six, for completing the western section. The capital authorized to be subscribed is nominally six millions; upon the subscription of a fourth of which sum, the subscribers were to become incorporated, with power to enlarge their capital, by further subscriptions, to the extent of their necessities.

The connexion of the Ohio with Lake Erie, a part of the original purpose of the Washington convention, though not comprehended in this charter, was by no means abandoned. A committee was deputed, by the convention, to memorialize the Legislature of the State of Ohio on that subject; which was discreetly left to the concurrent action of that State, and of her neighbor, Pennsylvania, in order to avoid the complexity and probable delay, of making a fifth party, to a measure, already requiring the assent of four Legislatures; and not only the consent, but a surrender of the rights of an existing company, incorporated by two of those Legislatures, for the attainment of a part, though a part only, of the same general object.

While these acts of legislation, with many and various amendments of them, comprehending three several acts of Virginia, seven of Maryland, two of Pennsylvania, and four of Congress, in all, sixteen in number, were maturing the charter of a joint stock company, examinations and surveys, preparatory to the commencement of the contemplated canal, were instituted by order of the President of the United States, under the authority of the survey act of the 30th April, 1824.

The first two of those examinations were of distinct routes across the Alleghany; the one leaving the Potomac at the mouth of Savage, the other at the mouth of Wills' creek. Both were conducted under the immediate inspection of a "Board of Internal Improvement," composed, by order of the President, through the Department of War, dated the 31st of May, 1824, of Brigadier General S. Bernard and Lieutenant Colonel Totten, officers of the army of the United States, and John L. Sullivan, a civil engineer, of the State of Massachusetts.

Two reports, in relation to the route, by the mouth of Savage, were made by this Board, (the last named member of it reporting separately;) and were communicated to Congress, by a message from the President, of the 14th February, 1825.

The report of the United States engineers confirmed the practicability of the contemplated union of the Eastern and Western waters, to the full extent of the most sanguine hopes of the Washington convention. They say to the chief of the corps of engineers, that, "In execution of the orders of the Secretary of War, communicated in your letter of the 31st of May last, to make a reconnoissance of the country between the waters of the Potomac and the head of the steamboat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining *the practicability* of a communication between those points; of designating the most suitable route for the same; and of forming plans and estimates, in detail, of the expense of execution; the Board proceeded from the seat of Government, through the portion of country indicated therein."

"Having deliberately examined every local circumstance, on that part of the Alleghany mountain, which lies between the head waters of the Potomac and those of the Youghiogeny, a branch of the Monongahela, the Board prepared instructions for the preliminary surveys and measurements, to be executed by the topographical engineers and other officers and gentlemen, attached for this service; and, having, now, maturely con-

sidered the circumstances observed by them personally, and carefully studied the results of such of these preliminary surveys as are completed, *they are decidedly of opinion that the communication is practicable.*" "The Board, on viewing the country *between the Ohio and Lake Erie*, along various lines indicated by public opinion, became possessed of such facts, as place the practicability of canalling, from the head of the steamboat navigation *in the Ohio, to Lake Erie, beyond all doubt.*"

In a subsequent part of the same report, they add, that "the investigation of the topography and watercourses of the country through which the Chesapeake and Ohio canal should run, and the results of our preparatory surveys, obtained up to the present moment, *demonstrate that this noble enterprise is practicable:* and, although we have not yet sufficient data to calculate the expense of the work, there is every probability that it will not bear any comparison with the political, commercial, and military advantages, which it will procure to the Union."

"In conclusion," the separate report of Mr. Sullivan, designed to illustrate and confirm that of his military associates, after having affirmed "*the quantity of water*" capable of being drawn to the summit level of the canal, "*to be more than treble that required,*" says that "no difficulty has been diminished or magnified. The obstacle to a communication, by the Potomac route, to the Western States, lessens to a point, compared with the magnitude of the object, whether in a commercial or political relation to the prosperity of the country. In Europe, their canals, even those of Governments, have all some definite, limited object of utility. But here it is not alone the distance, the elevation, the vast natural navigation to be connected, which constitutes the grandeur of the design; but the immense interests which it combines into a harmonious natural whole." Speaking of the connexion between "*the Ohio and the lakes,*" he says expressly, that "we saw no difficulty in making a canal from the mouth of Beaver to the mouth of Elk, in the distance of a little more than one hundred miles."

In the message of the President to the House of Representatives, accompanying these reports, he says, in confirmation of the opinion he had expressed in his message of the 3d of December, 1823: "From the views I have taken of these reports, I contemplate results *of incalculable advantage to our Union,* because I see in them, *the most satisfactory proof,* that certain impediments, which had a tendency to embarrass the intercourse between some of its most important sections, *may be removed without serious difficulty;* and that facilities may be afforded, in other quarters,* which will have the happiest effect. Of the right of Congress to promote these great results, by the appropriation of the public money, in harmony with the States to be affected by them, having already communicated my sentiments fully, and on mature consideration, I deem it unnecessary to enlarge at this time."

The above message and reports were unaccompanied by any detailed estimate of the probable cost of the proposed communication.

Prior to any such estimate, a further examination of the country lying between the Potomac and Ohio, disclosed to the "Board of Internal Im-

* Among the reports here alluded to, were plans for effecting the long contemplated connexion of Buzzard's with Barnstable bay, and the tide water of Taunton river and Narragansett bay with Boston harbor—works strongly recommended, as forming part of a line of inland navigation along the seacoast of the United States, from Boston, in Massachusetts, to the river St. John's, in East Florida.

provement" a route across the intervening mountains, more secure from accidental injury, or suspension; shorter by eighteen miles; requiring eight hundred and seventy-three feet less lockage; supplied with an equal quantity of water, at the summit level; and cheaper than the former, by more than half a million of dollars. This route leaves the Potomac at Cumberland, thirty miles below the mouth of Savage, and intersects Casselman's river, a branch of the Youghiogeny, at the distance of seventy miles, after passing the Alleghany, by a tunnel of four miles; the entire cost of which is included in the comparative estimate of the two routes in contemplation.

An elaborate report, accompanied by maps, plans, and very minute estimates, *assuming, as unquestionable, the practicability of both routes*, but giving a decided preference to that, by Casselman's river, was transmitted by President Adams to the House of Representatives, on the 7th of December, 1826. It computed the entire cost of the canal at more than twenty-two millions of dollars; and that, of the eastern, or Potomac section alone, at more than eight million one hundred and seventy thousand, exclusive of any allowance whatever, for land condemnations, or the usual estimate of contingencies.*

Having been communicated, by the Board of Internal Improvement, to the Secretary of War, in the preceding month of October, this estimate astounded many of the friends of the canal. Attracting the attention of the central committee of the Washington convention, it gave rise to a second meeting of that body, as it subsequently did, to a letter of the 13th of March, 1827, from thirty-two members of Congress, representing, in part, ten States of the Union, requesting of the President of the United States a re-examination of the proposed route for the Chesapeake and Ohio canal, *by two practical civil engineers;* who should be instructed to test, as they proceeded in another examination and survey, the accuracy, both in principle and detail, of all the prior estimates of the same work.

This request was promptly complied with by Mr. Adams, and Messrs. James Geddes and Nathan S. Roberts, two civil engineers of established reputation, who had been employed in the construction of the canals of New York, and subsequently engaged in the service of Pennsylvania, (the last being then the chief engineer of the western division of the great canal of that State,) were deputed, to perform the very important and delicate trust of revising the estimates of the Board of Internal Improvement. A part of their detailed report was communicated, through the Secretary of War, to the Committee on Roads and Canals of the House of Representatives, as early, as the 7th of January, 1828, and their entire report, to the House, accompanied by a letter from the Secretary, on the 15th of March following; two months before the subscription to the stock of the Chesapeake and Ohio canal, authorized by the act of Congress of the 24th of May of the same year.

The length of the line of canal between Pittsburg, and the basin, proposed by the Board of Internal Improvement to be constructed *at the market-house* in Georgetown, the Board made 341 miles and 676 yards; of which, the eastern section, lying exclusively in the valley of the Potomac, between Cumberland and Georgetown, comprehended 185 miles and 1,078 yards; the western, 85 miles and 1,010 yards, being the distance from

*In this report Dr. William Howard, of Maryland, was united, in place of Mr. Sullivan, with General Bernard; and Captain Wm. Tell Poussin, of the corps of Topographical Engineers, in place of Colonel Totten.

Casselman's river to Pittsburg; and their middle section, or interval between Cumberland and Casselman's river, 70 miles and 1,010 yards. The two last divisions, taken together, extend from Cumberland to Pittsburg, are in length 155 miles 1,358 yards, and constitute the "Western Section" according to the terms of the charter.

The plan of canal proposed by the Board of Engineers, to use their own language, had "a breadth at bottom of 33 feet; at the surface of 48 feet; the depth of water 5 feet; the towpath 9 feet wide; the guard banks 5 feet at the top; the surf berms kept on the level of the water, 2 feet wide each; towpath and tops of the guard bank 2 feet above the surface of the canal; the transverse section to be modified where local circumstances require it, and more especially in the cases of deep cutting, steep side cutting, embanking, and also where the canal is to be supported by walls." "In the framing of the plan," the Board say in their report that "a due attention has been paid to these modifications, with a view to conciliate the convenience of the work, with the strictest economy. The depth of five feet has been preserved throughout the line, but the *breadth* has been *often much lessened.*" "The locks have 102 feet between the hollow quoins, and 14 feet breadth in the clear; the main walls are built of *common range work masonry*; their facing *only* is laid with *water* cement. The aqueducts are to be built of masonry, and their lengths calculated to afford a free passage to the streams at the time of freshets." Whether their face stone was designed to be cut, or merely hammered, does not appear in their description of the aqueducts.

The United States engineers estimated the cost of the entire canal, on the preceding plan, at $22.375,429 69, of which, they computed their middle section alone, to cost $10,028,122 86; the eastern $8,170,223 98; and the western $4,170,223 78. In these estimates, they comprehend an allowance for additional fencing, as well as bridges; but make none whatever for contingencies, which are usually computed at 10 per cent.; nor for land purchases or condemnations, which have been found to be a heavy item in the actual expenditures of the Chesapeake and Ohio Canal Company.

Messrs. Geddes and Roberts, for want of sufficient time, returned a complete estimate for the eastern section alone;* and their survey, which began at Cumberland, terminated at the upper boundary of Georgetown, 2 miles and 278 yards below the old tide locks of the Potomac Company. They made the length of this section 186 miles and 1,353 yards; and applied their estimates, successively, to a canal of three several dimensions, passing, as nearly as practicable, over the same ground. For 60 miles and 1,054 yards, comprehending all "high and all river embankments, all steep hill side cutting, and deep excavation of earth or rock," they limit the canal to 40 feet breadth at the surface; the breadth of the *narrowest* of their canals; which is supposed to have but 28 feet breadth at bottom, with but 4 feet depth of water, and with locks only 90 feet by 15 in their chamber, being, in all respects, the dimensions of the canals of New York and Ohio.

The second plan to which their estimates apply, enlarges the canal for 126 miles and 299 yards, to the exact dimensions of that of the United States Board of Internal Improvement.

The third estimate was for a canal, to use the language of the report, "as recommended *by the Committee on Roads and Canals*, enlarged, *where*

* This omission has been since amply supplied by a laborious survey, and a detailed estimate of the western section, made by order of the Canal Board.

practicable by common excavation, to 60 feet at the surface, with a proportionate breadth at bottom, which is computed to be 42 feet; and 5 feet depth of water." The locks, in the third, are to be of the same dimensions as in the second plan. The enlarged dimensions were made to extend, as in that plan, to 126 only, of the 186¾ miles, between Cumberland and the upper boundary of Georgetown, where the survey of Messrs. Geddes and Roberts ended.

The estimates, including 10 per cent. for contingencies, but excluding any allowance for the purchase or condemnation of land or water rights, were, for the first canal $4,008,005 28, or $21,461 87 per mile; for the second, $4,330,991 68, or $23,191 38 per mile; and for the third, $4,479,346 93, or $23,985 79 per mile.

The prior estimate of the United States Board of Internal Improvement supposed the eastern section of the canal to terminate a few hundred yards lower down, than the point, to which the estimate of Messrs. Geddes and Roberts descended; and the former included, also, a basin between Bridge and Water streets, near the market-house in Georgetown, and computed its cost at $10,842.

The estimate of Messrs. Geddes and Roberts reduced the cost of the eastern section of the Chesapeake and Ohio canal below the most ardent hopes of the friends of that enterprise.

In the report of the central committee, to whom a deputation from Pittsburg, consisting of Harmar Denny and James S. Crafts, Esqs. had been previously sent, in order to correct the errors of the alarming estimate of the United States Board of Engineers, the committee state to the convention, at the opening of its second session, in December, 1826, that, "while they render every just tribute to the labor, learning, and ability of the Board of Internal Improvement, they are led, by their own experience, and by information derived from sources entitled to the highest respect and confidence, to question the accuracy of such portions of their estimates, as present to the judgment, facts, occurring daily within the sphere of common observation, rather than in the paths of scientific research. Such, for example," say the committee, "are the wages of labor, and the prices of the materials required for the construction of those parts of a canal, which resemble the ordinary works of the coarsest arts in the adjacent country; such, also, are the quantities, and, consequently, the values of the labor which can be performed on such works, by ordinary artificers and workmen, in any given time. To ascertain these particulars, by inquiries from a source, in which the Board and the public could not but confide, constituted one of the objects which prompted the central committee to invite the convention to reassemble in the city of Washington, and to extend that invitation to other counties and corporations interested in the purpose of its deliberations, but which were unrepresented at the former meeting. Among a body so constituted, and a people previously apprised of the objects of its reunion, there would be found, it was supposed, many individuals, who derive from their own observation, or would come charged with the results of the experience of others, as to the details of an estimate of the probable cost of the labor and materials required for the very simple purposes of excavating, embanking, walling, and paving a canal, and fencing along its border."

"The *quantity* of each species of this *work*, to be executed on any section or subdivision of the canal, depends, it is true," says this report, "on estimates founded on a scientific application of the structure or plan of the

canal, to the ground along which it is to extend, and on the quality of that ground; but that quantity being ascertained, and the manner of *its* execution determined, science has performed its office; and common experience, combined with an actual acquaintance with the resources of the country, must do the rest.

"Confining their remarks, for the present, to the estimates of the eastern section of the canal, which the Board propose to terminate at Cumberland, the distance of 186 miles from Georgetown, it appears that they have computed the cost of that section at $8,177,081 05 for excavation, embankments, walling, lockage, aqueducts, culverts, bridges, puddling, paving, dams, waste weirs, and gates, fencing, basins, and certain items not reducible to any general head of expenditure, but few in number, and amounting, together, to an inconsiderable sum.

"Of the specific heads, the five first mentioned cover near seven-eighths of the total cost of this section, in the proportions,

For excavation, of - - - - -	$2,515,176 46
embankments, - - - - -	685,456 11
walling, - - - - -	2,737,808 68
lockage, including guard locks, - - -	997,300 00
aqueducts, - - - - - -	521,696 00
Being a total amount of - - - -	$7,457.437 25

"Of the residue, or $719,643 70 of the estimated cost of this section, culverts, bridges, puddling, paving, and fencing, make up the sum of $532,109 11 more, leaving, for miscellaneous items, $178,534 59.

"The lowest price allowed for excavation is 14 cents the cubic yard, and the highest $1 65. The price per cubic yard, for embankments, varies between 12 and 42 cents. Of walling, 31 miles, the cost is from $3 to $5 18 cents the cubic yard, which makes the cost per mile, in lineal extent, average more than $88,000. The lift locks are computed, throughout, at $1,500 the foot lift. The masonry of the aqueducts, it is presumed, according to the same data. The puddling, amounting to $122,186, at 12 cents the square yard of 18 inches thickness: the paving, amounting in cost to $122,186, at 82 cents the square yard; and 175 miles of fencing, at $900 the mile.

"The committee have arrived at some of these results, with some care, and at some expense of time, in reviewing, during the short period allowed them, a work of much labor.

"They forbear to anticipate the judgment of the convention on an estimate adjusted to the compensation of one dollar a day for a common laborer, at work for ten hours, in a country abounding with the necessaries of life, and already possessing, along the greater part of the line of the canal, some of the advantages of navigation, to equalize their value, and where peculiar causes conspire to check the sudden rise of the wages of ordinary labor; and this price, extended to its humblest offices, is, moreover, augmented for the attendants in the subterranean tunnel, and in employments of like exposure.

"In an estimate, believed by the committee to exceed in amount the probable cost of this section of the canal, they have reduced these specific expenditures to 5,000,000 dollars, allowing, as part of that sum, four hundred thousand for unforeseen contingencies.

"The committee doubt not but that this estimate might be yet further reduced, and that the estimates of the other sections of the canal would admit of a larger ratable deduction, since peculiar errors enter into their formation; as a computation for the tunnels and the reverse arches, at the bottoms of the locks, of hard burnt bricks, of dimensions reduced to eight inches in length and two in thickness, but of four inches breadth, at $5 per thousand, on a supposition that but 60,000 of such bricks could be supplied by a kiln of 100,000, burnt in a country where wood is a nuisance; that common limestone does not exist, because it does not appear on the surface of the earth; and that lime, for water-proof cement, cannot be had nearer than the canal of New York, although it had not been searched for in the country most requiring its use: and it has, in fact, the committee is credibly informed, been since discovered there in great abundance, on the margin of a Western river.

"Those errors, if they are such, in a very able and valuable report, do not affect, in any degree, the merit of its authors, as scientific men, nor are the committee prompted to note them, but by an imperious sense of duty.

"To the unassuming personal and moral worth, and to the indefatigable industry of the distinguished member at the head of the Board of Internal Improvement, they unite with their fellow-citizens, in according the well-earned meed of public applause; nor do they withhold their thanks from his coadjutors in a work of equal labor and skill. The Board have failed, only where less ability was competent to the task which they have endeavored to perform, under impressions, perhaps, that the work, which they estimated, would readily command the wealth of a nation for its construction, and with feelings which would be less wounded by the discovery that they had under, rather than overrated its cost.

"Of their errors it should also be remarked, that, in the patient and ingenious analysis of their constituent elements, the Board have afforded an easy corrective, since they have left nothing to be supplied by those who follow them, but the labor of common sense, guided by the knowledge of common experience.

"In one of the estimates, submitted to the convention in 1823, the transverse section of the Chesapeake and Ohio canal was assumed to be, at the water line, 40 feet, at the base, 28 feet, with a depth of four, which, multiplied by the mean breadth between them, gave a surface of 136 square feet; while the canal, estimated by the Board, having a mean breadth of 40.5 feet, and a depth of five feet, has for its transverse section below its water line a superfices of 202.5 square feet in extent, and would cost, for excavation alone, according to the estimates of the Board, $838,000 less than that which they have recommended, and this without any reference whatever to several circumstances in the ground over which the two canals would pass, tending much to augment the cost of that which has the greater breadth.

"It was, therefore, with a prudent regard to the practicability of obtaining funds for the accomplishment of this great work, that the Federal and State commissioners have forborne to open books for the subscription of its stock, not only until the estimates of the Board had been received, but until some calculation might be made of the extent of the aid that may be derived from those sources of wealth, on which a work of such vast political importance naturally relies for the means of its execution.

"While the private subscriber to its stock may, indeed should be expected to regulate the amount of his subscription to such an enterprise, by a consideration of its immediate or remote returns in the shape of dividends or profit; while the cities, whose trade may be advanced by it, shall blend with this consideration, that of the augmented value which its success must bestow upon their fixed and active capital; the States so deeply interested in it may be expected to regard this prospective income as of inconsiderable moment, compared with the internal resources which so extended a line of inland navigation must promptly develop; the wealth which it must generate, employ, and enlarge; the population which it must attract, fix, and multiply; and the Government of the United States, strong as is its obligation to the District of Columbia, of which the founders of the Federal Republic have constituted it the paternal guardian, must more sensibly feel that, by the accomplishment of such an enterprise, a new momentum will be imparted to its defensive power, whether exercised upon the land or the sea, and an indestructible bond provided for the Union, and with it the prosperity of the people, for whose security, freedom, and happiness, it was instituted.

"Whether the powerful appeals which these interests and obligations address to the councils of the States and of the Union, shall be successful, futurity only can determine. It is for the convention to hasten its favorable decree, by presenting to those councils the ardent wishes, the just hopes, and the confident expectations, of their numerous constituents."

These copious extracts from the proceedings of that convention of citizens, to which the Chesapeake and Ohio canal owes both its name and its existence, manifest the extreme caution with which the friends of this great enterprise proceeded towards its accomplishment.

Their charter, with the amendments required to complete it, has been shown to have required the steady labor of five years; and to have involved the passage of sixteen different acts of legislation. Although their memorials, inviting a subscription of stock, were several years before Congress, until the final report of Messrs. Geddes and Roberts, in 1828, had confirmed the reduced estimate of the central committee, the action of the House of Representatives on the otherwise favorable reports of successive committees of that body, was not pressed by the numerous advocates of the measure in Congress.

It was doubtless the manifestation of this prudence and circumspection, which gave to the act authorizing the subscription of a million of dollars to the stock of the canal, so large a majority, on its passage through the House of Representatives, and secured for it the decisive sanction of the Senate.

The commissioners appointed in June, 1825, by the United States and the States of Maryland and Virginia, having concurred in this delay, did not open books for the subscription of stock to the canal, till the first day of October, 1827; on the second day of which month, an unconditional subscription, exceeding a million and a half of dollars, being more than one-fourth of the capital required by the charter, had incorporated the subscribers, according to its provisions. To enlarge this sum, by the addition of half a million, subscribed by the State of Maryland, and a fourth of a million by the Corporation of Alexandria, both sums being conditionally subscribed, it was necessary to await the expected subscription of a million by the United States.

The organization of the company, by the election of its officers, was, therefore, postponed by the commissioners until after the passage of the act of Congress, approved on the 24th of May, 1828.

On the 20th of June, being as early as practicable, with due notice to the stockholders, the first general meeting was convened in Washington. They elected their officers; enacted certain by-laws; and, before their adjournment, passed the resolutions necessary to give validity to the Pennsylvania act of incorporation, requiring the western terminus of the canal to be at Pittsburg; and to the subscription of Maryland, one of the conditions of which was, that it should be payable in the 5 per cent. stock of that State.

At this period, the available capital of the company consisted of the following sums:

Of 10,000	shares	subscribed	by the United States,	equivalent to	$1,000,000
10,000	"	"	city of Washington,	"	1,000,000
5,000	"	"	State of Maryland,	"	500,000
2,500	"	"	town of Alexandria,	"	250,000
2,500	"	"	Georgetown,	"	250,000
and 6,084	"	"	by private individuals, including 20 by the Corporation of Shepherdstown, in Virginia,		608,400

Making an aggregate number of 36,084 shares, and a value of $3,608,400 applicable to the construction of the canal.

The subscription of the United States diffused universal joy throughout the extensive country interested in this great enterprise; and, in unison with this grateful feeling, the Canal Board fixed on the approaching 4th of July, for its nominal commencement, and invited the participation of the Chief Magistrate of the United States in its ceremonial.

Accordingly, on the fifty-second anniversary of American independence, John Quincy Adams, President of the United States, in the presence of the representatives of several foreign nations, and of a vast concourse of his fellow-citizens, after an appropriate address, dug the first spadefull of earth from the channel of the Chesapeake and Ohio canal.

On the 15th of August, the Potomac Company surrendered, by deed, its chartered rights, to the new company. It was not, however, before the ensuing October, that the new canal was, in effect, begun; pursuant to the contracts for the construction of the thirty-four sections, being seventeen miles of it, which had been made on the 20th of August, 1828.

On the 25th of the ensuing October, fifty additional sections were placed under contract; comprehending the remaining space, between the head of Seneca falls and the "Point of Rocks," and all the masonry of the eighty-four sections, between the foot of the Kitoctan mountain, and the junction of the new canal with the works of the Potomac Company at the Little Falls: the contracts for the masonry of the sections let in August, having awaited the discovery of suitable stone, in convenient situations, and of hydraulic lime, of a quality to be relied on, for the construction of the locks, aqueducts, and culverts. Special agents were deputed to explore both shores of the river, as well as the adjacent country, for these essential materials; and the successful issue of their search was published prior to the October contracts.

On the 5th of the ensuing December, a distance of five miles, between

the Little Falls feeder and the mouth of Rock creek, which separates Washington from Georgetown, was divided into eight sections, and placed under contract. The line of canal, thus let out for construction, in the first five months after the organization of the company, was laid out and marked on the ground, by Doctor John Martineau, a civil engineer, of New York, under the supervision of another eminent civil engineer, Benjamin Wright, Esq. of the same State, then, and for two years after, acting engineer in chief of the Chesapeake and Ohio Canal Company.

The ninety-two sections comprehend, in a line of forty-eight miles, two aqueducts; one of three, and the other of seven arches of fifty-four feet span each; seventy-four culverts, of which many are enlarged to serve for roadways under the canal, and substitutes for ferries or bridges over it; a dam across the Potomac, at the head of the Little Falls, 1,750 feet long, and another, at the head of Seneca falls, of 2,500 feet; twenty-seven lift locks, exclusive of a tide lock and a guard lock; seventeen houses for lockkeepers, two of which are enlarged, to serve, also, as places of rest and accommodation for passengers; three feeders from the river, and one from an intermediate stream introduced at little cost; several basins, one of which, designed as a capacious harbor for boats, is sustained by a mole across Rock creek, erected in twenty feet water, in length 1,000, and breadth 160 feet, through which, a lock connects the navigation of the canal, with the tide of the Potomac and the Chesapeake.

By the 1st of October, 1830, in less than two years from its commencement, the most difficult part of this work had been completed; and the formidable and dangerous obstructions to the river navigation, between Seneca and tide water, removed by overcoming an ascent of 195 feet in a distance of twenty miles.

The 78th section, within three miles of the "Point of Rocks," containing 30,000 yards of excavation, was the work of 111 days, ending with the 6th of May, 1829.

At this point, the further progress of the canal had been arrested, immediately after the organization of the company, by an injunction of the Chancellor of Maryland, issued on the 25th of June, 1828, at the suit of the Baltimore and Ohio Railroad Company. This legal obstruction, having been confirmed by the Chancellor, continued till the reversal of his decision, by the judgment of the Court of Appeals of Maryland, pronounced on the 5th of January, 1831. During this long period, exceeding three and a half years, the portion of the canal between Seneca falls and the "Point of Rocks," awaited a supply of water from Harper's Ferry, the intended position of the third dam and fourth feeder from the river Potomac. To reach this feeder, it was necessary, not only that the legal obstruction which impeded the progress of the canal should be removed, but that, after its removal, the canal should be extended fourteen miles above the "Point of Rocks," through the disputed ground; a work, in itself, of very difficult and laborious construction.

As soon, therefore, as the final issue of the legal controversy, depending at Annapolis, the Board of Directors proceeded to place under contract, the twenty-eight sections, between the "Point of Rocks" and the head of Harper's Ferry falls; where there was a dam already erected by the Government of the United States. The sections regarded as the most difficult to construct, were let with despatch, to experienced contractors, selected by the Board, from the whole number in their service, so as to bring into use,

as speedily as possible, the twenty-six miles of canal, then nearly completed, between the "Point of Rocks" and Seneca: on which, the capital expended had long laid dead, and would obviously so continue, until the necessary supply of water, for its navigation, could be brought from above.

At the same period, the portion of the line was also let, which lies between the Rock creek basin, and the mouth of Tiber creek, in the city of Washington, the fixed eastern termination of the Chesapeake and Ohio Canal.

The charter of the company having required that one hundred miles of the eastern section should be completed in five years from its commencement, the Board diligently proceeded, without claiming protection from the illegal impediments thrown in their way, to place under contract, thirty-six miles of canal, next above the head of Harper's Ferry falls; which, added to the sixty-four miles already let, below, would make up one hundred. As the best situation for a dam across the Potomac, required for the fifth feeder from the river, was found to be eight miles above Williamsport, and one hundred and nine above the basin of Tiber creek, the contracts of June and August, 1831, were extended through that distance, except for the seven miles immediately above the dam erected across the Potomac, between Williamsport and Shepherdstown; along the slack water of which, it was deemed expedient to substitute a temporary towpath, for a canal, till the remaining one hundred and two miles should be completed.

The State of Virginia having, however, in February, 1833, subscribed 250,000 dollars to the stock of the company, and a compromise effected under the sanction of an act of the General Assembly of Maryland, with the Baltimore and Ohio Railroad Company having added the further sum of 186,000 dollars to the available funds of the company, the Canal Board proceeded, in the ensuing month of May, by further contracts, to substitute a continuation of the canal, for the towpath, through four of the seven miles above mentioned.

Of the whole line of canal, the progress of which has thus been very minutely detailed, 64 miles were completed, and capable of navigation, in October, 1833. Of the residue of the line, under contract, it is ascertained that 21 miles await, to be brought into use, the completion of a single lock only, and the aqueduct across Antietam creek, the labor of a few weeks. The line of 24 miles passing from dam No. 4, by Williamsport, it is very confidently stated, can be readily completed in the present year: the far greater portion of it being already done, and the delay of the residue imputable to the extension of the line, under contract, in May last, by transferring the river locks, from a point two miles above, to one two miles below the mouth of Opeccon, in compliance with a condition of the late Virginia subscription. But for the intervention of the cholera, in the autumn of each of the last two years, all the works let in 1831 would have been completed, as the contracts for their construction required, in the spring of 1833. The annexed reports of the Board of Directors, to the stockholders, and of Capt. McNeill, of the corps of engineers, to the Department of War, will manifest the grounds of this belief, and the condition of all the works completed or under contract, as well as of the funds of the company, prior to the general meeting in June last. (Vid. App. C.)

By the compromise effected with the Railroad Company, and the subscription of Virginia, as has been stated, apart from the favorable moral influence of both events, the effective resources of the canal were considerably augmented.

It now appears, from a statement of Mr. C. B. Fisk, the engineer superintending the graduation of the railroad, at the points of interference between it and the canal, that, by replacing the sum which had been expended, prior to the compromise, on the Frederick county road at Harper's Ferry, and the economical though yet faithful construction of the work undertaken by the Canal Company, accompanied with a slight reduction of the breadth of the canal, for short distances, at the above points, the compromise will be made to enlarge the canal fund by the addition of $186,000.

The capital stock of the company, exclusive of that payable in the stock and debts of the old Potomac Company, amounted, at the general meeting in June, 1833, to $3,858,400, payable in money; that paid in the stock of the Potomac Company, to $209,707 31: and that paid in the debts of the company, to $46,804 31; making a capital of $4,114,911 62: of which, $3,858,400 may be considered as efficient stock, entitled to immediate dividends.

The charter which provides for the conversion of the stock, and debt of the old, into the stock of the new company, expressly limits the amount of the one to $311,111 11, and of the other to $175,800; but defers the right to claim a dividend on either, till the subscribers of the capital, payable in current coin, shall have received an income of ten per cent. per annum.

If to the available capital subscribed, there be added, the sum which had been received from the Railroad Company, on the 1st of January last, with that, to become due after that date, along with the tolls collected prior to that period, and certain miscellaneous items, amounting to $11,592 37, the total amount of the work paid for, and of the available funds of the company, for its further prosecution, will be found to have been $4,050,992 37, exclusive of $55,000 borrowed of certain banks, and charged upon the payments of the Baltimore and Ohio Railroad Company. This loan did not add to those resources, but arose from anticipating the collection of a part of them.*

By referring to the Treasurer's monthly abstract of December 31, 1833, and the amount of stock then and since subscribed, the receipts and disbursements of the company, and the state of their funds on the 1st day of January, will appear to have been as follows:

There had been received $3,927,716 63, in the several sums, and from the sources following, viz.

On account of the capital stock paid in by the subscribers,		$3,589.252 64
"	the compromise with the Balt. & O. R. R. Co.	177,333 35
"	tolls to the 31st of December, 1833, -	94,538 27
"	old houses and materials sold, - -	514 80
"	sums paid agents and refunded, - -	752 31
"	profit on the sale of Maryland stock, -	4,703 03
"	interest received from delinquent subscribers,	989 79
"	costs of suit recovered, - - -	3,847 62
"	the Potomac Company, being the proceeds of debts due them at the date of the transfer of their charter, and of unclaimed dividends,	784 82
"	loans negotiated at several banks, - -	55,000 00
Making the aggregate amount of receipts, as above,		$3,927,716 63

* The preceding date was assumed, under the impression that time would not be allowed to bring this account down to a later period.

And there had been then expended, the following sums, on the following objects, viz.

On the construction of the canal, including $82.604 10 laid out in three years' repairs and improvements, and $65,477 56 expended in the graduation of $4\frac{1}{10}$ miles of railroad, - - -	3,325,908 65
On the acquisition of lands, and the attendant expenses of juries, and fees of sheriffs and counsel, - - -	171,471 62
The engineer department, - - - - -	115,942 22
The salaries of officers, - - - - -	41,376 29
Contingent expenses, - - - - -	13,116 93
Lawsuits, fees of counsel, &c. - - - -	13,197 18
The wages of lock-tenders and collectors, a sum chargeable on the annual revenue from tolls, - - -	9,831 72
In the reimbursement of tolls, and payment for damages to boats, - - - - - - - -	838 43
In payment of interest on loans, and of discounts on the instalments of stockholders, paid in advance, - - -	3,019 68
Stationery, printing, and postages, - - - -	8,028 08
In the purchase of lands for the western section, and a re-examination, survey, and estimate of the same, as far as Pittsburg, - - - - - -	4,026 08
In payment of a dividend due from the old Potomac Company, but unclaimed till after the transfer of its charter, -	5 55
Being a total expenditure of - - -	3,707,262 43
And leaving unexpended, of the total amount received, viz.	3,927,716 63
A balance of - - - - -	$220,454 20

Which consisted of deposites in bank to the amount of $1,704 20, and of $218,750 vested in Washington and Georgetown Corporation stocks, bearing an interest of six per cent. and payable on the 1st day of July, 1834, being, as above, $220,454 20. Added to which, there remained, on the 1st of January, 1834, to be received:

From the United States, - - - - -	$5,000 00
From the State of Maryland, - - - -	6,250 00
From the Corporation of Shepherdstown, - - -	1,750 00
From the private stockholders, - - - -	261,781 00
And from the Baltimore and Ohio Railroad Company -	88,666 65
Making, in cash on hand, stocks, and sums to be received, the aggregate amount of - - - -	583,901 85
To this amount, the late subscription of the State of Maryland has since added the sum of - -	125,000 00
So that, supposing the balances due from the private stockholders to be available, the aggregate amount applicable to the work remaining to be done on the 1st of January last, was - - - - - -	708,901 85

But from this sum should be deducted, for deaths, removals, and insolvencies, among the private subscribers, occurring in a period of five years and a half, since their

subscription was made, according to official statements - - - - -	75,000 00	
Also the debt due the banks, and charged upon the railroad fund, in the account of December 31, 1833 - - - - -	55,000 00	
And the further sum of $35,000 supposed by Mr. Fisk, the engineer, to be necessary to complete the graduation of the $4\frac{1}{10}$ miles of railroad, assumed by the compromise - - -		35,000 00
Being in all - - - - - -		$165,000 00
Which deducted, left to be applied to the unfinished work, and the payments of the several sums retained out of the monthly estimates of the contractors, for work done, until their contracts should be completed, the sum of -		543,901 85
The subsequent reports of Messrs. Purcell and Fisk show that there remained to be expended on the 31st of December last, in order to complete the several works under contract, the following sums :		
For that part of the canal between the head of Harper's Ferry falls and dam No. 4, five miles below the mouth of Opeccon -	51,799 75	
For the part of the line, let in August, 1832, lying between that dam and another erected eight miles above Williamsport -	259,398 96	
For the extension of this portion of the canal, four miles lower down, being from two miles above, to two below the mouth of Opeccon -	103,020 80	
For the towpath to connect this portion of the canal with that below dam No. 4 -	34,950 00	
Making the total amount of the value of the unfinished work to be done on the canal, not in use, on the 1st of January last, the sum of - - - - - -		449,169 51
Which, deducted from the fund applicable to this work on that day, leaves a balance of - - - - -		$94,732 34

exclusive of the tolls of the first six months of the present year.

This last balance will be applicable to the contingent expenses of the work to be done, and to the payment of the retained money which was to become due, for the work done under contracts not then fulfilled. (Vid. App. D.)

It appears, from this statement, that the work under contract required, for its completion, the entire resources of the company, supposing these resources to be available, after a deduction of $75,000 for bad debts. (Vid. App. E.)

The canal will be navigable, within the present month, or very early in the ensuing, as high up the valley of the Potomac, as dam No. 4, within about ten miles of Hagerstown. By the end of the ensuing autumn, it will be open to dam No. 5, eight miles above Williamsport, and within $2\frac{1}{2}$ miles of Clear Spring, a village west of Hagerstown, on the turnpike leading from Baltimore to Cumberland.

The stock, on which, a dividend may be declared, after deducting from the sums subscribed prior to the 1st of January last, $75,000, the supposed amount of forfeited shares, and adding the 1,250 shares subsequently sub-

scribed by the State of Maryland, will consist of $3,908,400, held in the following proportions :

By the United States	10,000	shares.
By Maryland	6,250	do
By Virginia	2,500	do
By Washington	10,000	do
By Alexandria	2,500	do
By Georgetown	2,500	do
By the Corporation of Shepherdstown	20	do
And by private citizens	5,314	do
Being, as above stated	39,084	shares.

Having presented to the House a detailed statement of the origin of the Chesapeake and Ohio canal, of the various plans proposed for its construction, and the estimates of each, and of the progress, cost, and present condition of the 109 miles of it already completed,* or very nearly so, the committee proceed to compare its present, with its proposed dimensions, and its actual with its estimated cost: with a view to obviate objections to either, and to infer the probable expense which will attend the completion of its eastern section, from the cost and manner of constructing the part of it already finished.

The plan and cost of the Chesapeake and Ohio canal have both been the subjects of much and repeated misrepresentation. The former has been pronounced magnificent, without use, and the last extravagant and wasteful. It will be seen, in the course of this inquiry, to what extent, either charge, is well or ill founded.

The canal, now in use, below the head of Harper's Ferry falls, sixty-four miles in extent, has for its cross section 306 square feet; its breadth at the water surface being sixty feet, at bottom forty-two feet, and its depth of water six feet. Its tow-path is twelve feet wide at top, its guard or berm bank on the opposite side, eight feet, and both are raised two feet above the water, and of course eight feet above the bottom, which gives to the inner slope of its banks a rise of one foot in one and a half. The canal is reduced in breadth below those dimensions, whereever much additional expense would have attended a close adherence to them, which was the case for a few miles only. For a much greater distance, where no extra cost attended it, its breadth is enlarged beyond them. In the forty-three miles of canal under contract, or not yet navigable, above Harper's Ferry, its breadth is reduced, as the first annual report proposed, to fifty feet at the surface; except where its breadth below, could be preserved without extra cost; or it was cheaper to extend it even beyond sixty feet, as has been the case for several miles of that distance. Its depth, throughout, is never less than six feet; though in some places it exceeds it, and for near a mile, it varies from six to forty feet, as at the Bear island pond.

Its lift locks of cut freestone, limestone, or granite, 45 in number, average eight feet lift, and are one hundred feet by fifteen in the chamber, being designed for one hundred ton boats, to be drawn, each, by two horses, attended by two men and a boy. Its guard locks, four in number, are of the same species of stone, with hammered faces. Its aqueducts, five in number, one of cut freestone, one of cut granite or gneiss, and three of rock work; two of them have their faces of limestone blocks, the beds and joints of which are cut, and the outward border of each stone for one inch from the joint: the face of the sheeting is also cut. The culverts, are in number

* The water has been admitted into it, from dam No. 4, since this report was made.

136, of which many are enlarged to a breadth of ten feet and upwards. Their length is such, as allows to the canal, every where, its full breadth; and they are of the same materials with the aqueducts; the ring stones of their arches are cut, the rest of the stone hammered, but not ranged. The locks, aqueducts, and culverts are laid in hydraulic lime, of approved quality, mixed with pure sand, in equal proportions; except in rare cases, where the oxyde of manganese, or an artificial composition of iron filings and common lime, has supplied the place of the natural hydrate of lime.

A small quantity of Parker's Roman cement has also been used, for experiment; but being found expensive, and that its place could be securely supplied by the native hydrate of lime, its consumption was stopped.

In place of permanent bridges, for preserving a communication across the canal, an amendment of the charter allows the substitution of aqueducts beneath, or ferries over it; and where neither would be practicable or convenient, the use of pivot bridges; which being erected, at little cost, across the locks, they are, for that reason, located, where it could be done without extra expense, in the public roads leading to ferries. But one permanent bridge, the string pieces of which are elevated thirteen feet above the water, has been erected across the canal, above the upper boundary of Georgetown; and in that, it is designed to provide hereafter a draw, for the passage of steam or sail boats.

To save the waste and cost of lands, to avoid the charge for extra fencing, and obviate the necessity of frequent passways over, or under the canal, its location has been conducted, as near the river as practicable with safety to its embankments and other works; and in some cases, with a view to economy, small slips of land lying between the canal and the river bank, have been purchased of the proprietor.

Its towpath, above Georgetown, is always on its river side; and wherever that is in danger of abrasion by the current, it is carefully protected by substantial slope walls, constructed generally of stone selected from the excavation.

The best of the smaller stone are used for an inner lining of the canal, which already extends through many miles of it; and when time shall allow for the transportation of the superabundant stone, to where it is needed, this improvement will pervade the whole line of navigation, so as to save, in a great degree, the necessity of future repairs; and to fit it, as originally intended, for the application of steam, as its moving power, without injury to the inner slope of its banks.

Such is the plan of this great work. The manner in which it has been executed will be best understood, by referring to two very critical and careful examinations of it, made by skilful engineers of the topographical corps of the army, by order of the President of the United States, at the request of the president and directors. The first was conducted by two officers of high rank, Colonel John J. Abert and Colonel James Kearney, in June, 1831. A copy of their report, bearing date the 14th of that month, will be found in the appendix to this report. (Vid. B.) After a very minute description of all the works then completed, or in progress, between the Rock creek basin, in Georgetown, and "The Point of Rocks," their report closes with this strong testimony in favor of the manner of their execution. "We are fully aware," say Colonels Abert and Kearney, "that, after all we have said, we have not yet given an adequate idea of the great and interesting work we have been directed to examine. The difficulties

which have been surmounted, the quantity of labor it has received, the vast amount of rock excavation, the extent and excellence of the walls of dry masonry, the durable aspect of all the structures, the great and imposing dimensions of the canal, the judicious adaptation of the excavations to the fillings and embankments, can be duly appreciated only by visiting the work. The trade of the canal on the part now in use," they add, "is very active."

Speaking, in an earlier part of their report, of one of the distinguishing features of this canal, these engineers remark, that "one mile from the *roadway*, at Hillary's farm, another arched roadway is in progress. The work is completed to the height of the abutments, and is a fine specimen of masonry. The passway between these abutments is ten feet wide. Three-quarters of a mile further, a pit is excavated, and part of the foundation laid for another roadway intended for the convenience of Conrad's ferry. We cannot here *forbear expressing our decided approbation* of this method of passing canal lines, over the more usual method by bridges. Its many conveniences to those who use these roadways, as well as to the canal, should, in all cases, give to them a preference, where the ground is adapted to their construction." "The usual time," they remark in another part of their report, "employed in the passing of a lock, by the packet boat, is *four minutes*. A passage, however, may be readily effected in *three minutes and a half*, and we were informed that, in an experiment of several passages, the average of the time occupied was *but three minutes*."

The second examination of the canal by the authority of the Executive, was confided to Captain William Gibbs McNeill, also of the corps of topographical engineers, who, to the scientific knowledge, belonging to his profession, as a *military engineer*, adds the fruit of an experience enlarged by several years' employment in civil engineering; for which, the better to promote his usefulness, he visited, with the permission of the Executive, the canals as well as railroads of England, the country most distinguished for both these species of internal improvement. His inspection of this canal, in June, 1833, comprehended the entire line, completed, or under contract, from the mouth of the Tiber to the dam eight miles above Williamsport; and extended not only to the *structure* of all its works, but an elaborate investigation of their respective cost; and an examination of the records and the condition of the offices of the clerk and resident engineers of the company. That he had every facility which he could desire, in the discharge of his duty, afforded him by the officers and engineers of the company, is manifest from his report, which closes in the following terms: "A disposition was manifested by all, to invite the strictest scrutiny, not only of the manner in which the work had been executed, but also of its cost;" and he adds, "I may not withhold my willing testimony to the highly creditable arrangement of the archives of the company, which, from an examination, whether at their office in Washington, or the two residencies at Harper's Ferry and Williamsport, is such, as to admit of the *most ready reference*, and to provide for the most *satisfactory accountability* for the various disbursements of the company."

Of the plan of the work, he gives this description: "As it respects the cross section, or dimensions of the canal, its general breadth, below the abutment of Harper's Ferry bridge, is 60 feet, at the surface, with a depth of *six* feet: while, above the abutment, (the depth remaining the same,) the breadth is diminished to 50 feet. In both cases, however, there are excep-

tions to these general dimensions: as, for instance, between Georgetown and the Little Falls, a distance of five miles, the canal has, in general, a width of *eighty feet*, with a depth of *seven feet*. In other situations, as between the Point of Rocks and Harper's Ferry, we find that, in a distance of twelve miles, the width of the canal varies, for three and one-fifth miles, from seventy to eighty, and even one hundred feet; but it is to be remarked, that the advantages of this increased width, were here attained *without additional cost*, and, indeed, from the nature of the ground, *at less* expense, than if the regular width of sixty feet, adopted for this portion of the canal, had been adhered to.

"For like reasons, that is, because of greater economy of construction, above Harper's Ferry, in a distance of forty miles, it has been found expedient to deviate from the regular width of fifty feet for five and a half miles." "In contemplation of these dimensions, or rather of those more generally adopted for the cross section of this canal, we are led to remark, that (however expedient it may have been to reduce the width above Harper's Ferry, in order that, by husbanding their resources, the company might, with great certainty, reap the expected fruit of their enterprise, when the canal shall have reached the vicinity of the exhaustless coal mines of the Alleghany mountain) a consideration of the superior advantages of the more enlarged dimensions, at least, justifies, in my opinion, the expectation that a full equivalent for the increased cost attendant on them will hereafter have been realized.

"They have obtained, it will be recollected, on a portion of the canal, which will not only concentrate almost the whole trade to be derived from successive contributions, in its progress from Cumberland, if not from Pittsburg, towards Georgetown, but on a portion, to which will be confined the important accession to the general trade of the canal, in the transportation of the varied products of the fertile and extended valley of the Shenandoah. An additional motive may also be found, to compensate for increased cost of construction, in the greater effect of the moving power, (see calculations on this subject, based on the experiments of D'Alembert, Condorcet, Bossuet, and Dubuat, in the report of the United States Board of Internal Improvement, made in 1826,) and the consequent reduction in the expense of transportation, which, when it is recollected that this portion of the canal must compete with the Baltimore and Ohio railroad, is not the less calculated to make the canal productive. (Vid. App. F.)

"Similar reasons do not obtain, to the same extent, in recommendation of the like dimensions beyond Harper's Ferry; and it is, therefore, in harmony with the principles which govern both the plan and execution of this work, that, above this point, we find its greatest width diminished. I would respectfully submit, however, the opinion, which I entertain, that, in the further prosecution of this canal, considerations of cost of construction would have an undue influence, and the utility of the work be impaired, if, *at least, the dimensions adopted, although not preferred, by the United States Board of Internal Improvement*, be not preserved."

In commenting on that feature of this canal which distinguishes it from the canals of America, and regarding its present length and expected extension, from all other canals in the world, Captain McNeill says: "At the Point of Rocks there was under construction, and nearly finished, one of these pivot bridges, which, wherever bridges have been thought necessary, from the intersection of the canal with a public road, have been substituted for the permanent bridges which constitute such a source of annoyance

on canals generally." "Permanent bridges having been entirely dispensed with above Georgetown, unless the high wooden bridge opposite the falls be an exception," "there will be no obstruction to the safe and comfortable transportation of passengers on the canal with such celerity as, amid all the improvements of the age, it shall be found practicable and expedient to attain." The bridge at the falls, the committee are apprised, is not to remain an exception, it being intended to insert in it a draw.

In speaking of the "character and condition of such portion of the canal as had either been completed or placed under contract; which, computing from the basin in Georgetown, where" his "examination began, ascends the valley of the Potomac upwards of 107 miles, or to the" river "lock next to dam No. 5, above the town of Williamsport," Captain McNeill says: "Of this portion, every part of the work may be said to have been entirely completed to the Point of Rocks, 48 miles from the basin at Georgetown, (in June, 1833,) and, with very unimportant exceptions, where the discovery of slight imperfections has already led to their repair, exhibited *all the faithfulness of execution which ensures stability.*" He adds, "the reports of Colonels Abert and Kearney, who preceded me on a similar examination in 1831, so minutely described this section of the canal, that a very general summary will suffice to exhibit the facts which I would bring in review on this occasion. In the words of the late President of the company, (see third annual report, page 13,) it may emphatically be remarked that 'on no canal in America, and very few, if any, in the world, will there be found, and certainly on no part of the Chesapeake and Ohio canal do there remain to be encountered, obstacles more appalling than have been overcome.'

"True it is, that he refers more especially to that particular section which embraces the descent between the Great and Little Falls of the Potomac; 'a compass of eleven miles along precipices, bounding a river which has borne on its bosom ice and snow elevated for several miles 30 feet above its ordinary height.' Yet the numerous locks and culverts, the extent of rock excavation, and of outer walling which has been found necessary to the support and protection of the towpath, two expensive aqueducts, &c., constitute difficulties characterizing the whole section under consideration, which, from description alone, can scarcely be appreciated."

Captain McNeill's report affords the following summary of the "total quantity of excavation and embankment," with their cost "in their several varieties, in order to form the trunk of the canal, from the Rock creek basin, at Georgetown, to the Point of Rocks.

			Av. per yd.	Common av.
Grubbing,	- - -	12,892		
1,893,666 cubic yds.	common excavation,	190,917 -	cts. 10	12 62/100
439,071 do.	hard pan,	103,412 -	23 55/100	
75,472 do.	quarry rock,	23,761 -	31 48/100	67 46/100
398,524 do.	rock blasted	295,996 -	74 27/100	
571,121 do.	embank. from canal,	75,284 -	-	13 18/100
962,729 do.	do. *not* fr. canal,	185,749 -	-	19 29/100
97,092 do.	puddling,	25,107 -	-	25 86/100
215,701 perches of walling, of stone paid for as excavation,		116,407 -	perch	53 97/100
15,363 perches not paid for as excav'n		15,528 -	-	$1 01 7/100
Extras* - - -		40,800		
Total -		$1,085,853"		

* The extras consist of the houses of lock tenders, inner pavement, waste weirs, &c. &c.

Captain McNeill next proceeds to consider the condition of the work above "the Point of Rocks." "This, which, as has been stated," he says, "extends for a distance of 107 miles from Georgetown, had already so far progressed, that the expectation might be confidently entertained that by the opening of the coming spring" (that of 1834) "it will have also been entirely completed." Indeed, the interval between the Point of Rocks and the head of Harper's Ferry falls, a distance of 14 miles, it was supposed would at all events be finished (as it is believed it has been) by the 1st of September past, and that, during the current year, the use of the canal would be secured as far as Shepherdstown, 72¼ miles from the basin at Georgetown.

"These expectations were thought by me to be well founded, and in accordance with the statements furnished me of the work done, compared with that remaining to be done, confirmed by my own observations, at the time alluded to," (between the 4th and 10th of June, 1833.)

"The formation of the canal, including the excavation, embankment, and necessary walling, was on the 1st of May more than half completed. The seven locks between the Point of Rocks and Harper's Ferry were so nearly finished at the time of inspection, that it was estimated that the sum of $2,000 would suffice to complete them; and of the remaining ten locks then in progress, about one-third of the work had already been completed." The report then supplies the following comparative statement of the progress which had been made in the formation of the canal above the Point of Rocks.

"*Work done.*

Grubbing - - - -		$7,151	19		cents.
1,516,016	cubic yards excavation of earth,	182,614	49,	av. p. yd.	12 5/100
253,994	do do rock,	168,348	70,		66 29/100
262,189	do embank. from canal,	28,567	60,		10 90/100
394,228	do do. *not* from canal,	92,727	56,		23 52/100
10,167	do puddling - -	1,776	00,		17 47/100
103,139	perches of wall, constructed of stone out of the excavation -	46,950	99,	perch	45 52/100
3,482	perches of wall, constructed of stone, not paid for as excavation	3,208	00,		92 13/100
Extras - - - - -		2,428	13		
		$533,772	66		

"*Work to be done.*

Grubbing - - - -		$2,501	81		
1,157,889	cubic yards excavation of earth,	133,532	81,	av. p. yd.	11 53/100
179,758	do do rock,	110,897	95,		61 69/100
8,150	do do slate,	1,841	00,		22 59/100
184,569	do embank. from canal,	20,530	63,		11 12/100
509,163	do do *not* from do	103,733	78,		20 37/100
27,450	do puddling - -	3,390	75,		12 35/100
68,168	perches of wall of stone out of excavation - - -	32,822	02,	perch	48 15/100
6,240	perches of wall of stone, *not* out of excavation - -	5,794	00,		92 85/100
Extras - - - - -		6,136	00		
		$421,180	21		

"All earth paid for as excavation, and *hauled more than* 120 *feet*, is considered as embankment from canal, in contradistinction to that obtained from the outside of canal; and, in like manner, there is a division of the wall into walling from stone which comes out of the excavation of the canal, and that which does not.

"As it has been stated, that below the Point of Rocks, massive walls were often unavoidable for the support and protection of the canal, so above the Point, do the numerous cliffs which impinge upon the stream, frequently necessitate a location fruitful in like sources of expense. And as some diversity of opinion seems at one time to have prevailed, respecting the *particular* location around the Point of Rocks, or between that spot and Harper's Ferry, my attention was naturally directed to the subject, and it has resulted in the opinion, that whether a canal or railroad had been the object *singly*, the engineer, in consulting the interests of either, could scarcely have found a reason for preferring a greater exposure of the work, than that which was irremediable, if he would avoid, (as he has done in the location of the canal,) an undue quantity of rock excavation. Of the extent to which the canal, under the advantages acquired by priority of construction, is notwithstanding washed by the river, or in the occupancy often of a portion of its bed, it will suffice to state, that walling has been necessary, to its protection, for about ten miles of the distance now under contract, above the Point of Rocks. On this portion, we find also, that the paving of the inner slope of the towing path has continued to be judiciously persevered in, whenever a surplus of rock excavation would afford the materials, as was found to be the case, for seven miles and nine-tenths, or more than half the entire distance, between the Point of Rocks and Harper's Ferry falls. From this last named locality upwards, we have not the means of estimating, with precision, the extent to which the inner paving will be continued, as it is the last operation incident to the completion of the canal."

After a particular description of each work on the canal, not minutely described in the long antecedent report of Messrs. Abert and Kearney, Captain McNeill expresses the hope "that the foregoing statements will have furnished, with sufficient minuteness, such details as" he had "been enabled to collect, as well from observation as from a careful examination of the archives of the company, illustrative of the *cost*, *character*, and *condition* of the work. Such," he adds, "as relate to the formation of the canal are recapitulated in the following summary, exhibiting the total amount of the embankment *done* and to be done, at the date of the inspection, on the whole canal completed and under contract, *above its* entrance into the Rock creek basin, exclusive of the additional quantities and cost resulting from the transfer of locks Nos. 41 and 42, as previously stated, four miles lower down the river, viz.

Grubbing, - - - -	$22,545 00				
5,006,642 cub. yds. of earth - -	610,475 76,	av. per yd.	12 $\frac{19}{100}$
907,698 do rock - -	599,003 65,	do	65 $\frac{99}{100}$
8,150 do slate - -	1,841 00,	do	22 $\frac{59}{100}$
1,017,809 do emb'kt from canal	124,382 23,	do	12 $\frac{22}{100}$
1,866,120 do em. not from canal	382,210 34,	do	20 $\frac{48}{100}$
134,709 do puddling -	30,273 75,		
387,008 perches of stone p'd for as excav.	196,180 01,	do perch	50 $\frac{69}{100}$
25,085 perches *not* p'd for as excavation	24,530 00,	do	97 $\frac{79}{100}$
Extras - - - -	49,364 13		
	$2,040,805 87		

"Of the above amount, the value of the work done of the above description, on the 1st May, was $1,619,625 65; and of that then remaining to be done, $421,180 22; (or, allowing for the transfer of locks 41 and 42, say $521,180;) and the average prices of the whole work, '*done and to be done*,' will be as follows, to wit:

Cut stone, locks, including foundations and gates, per foot lift,	$1,156 00	
Excavation of earth, per yard,		12 $\frac{19}{100}$ *cts.*
Do. rock do		65 $\frac{99}{100}$
Do. slate do		22 $\frac{59}{100}$
Embankment from canal, per cubic yard,		12 $\frac{22}{100}$
Do. not do. do.		20 $\frac{48}{100}$
Walling of stone, paid for as excavation, per perch		50 $\frac{69}{100}$
Do. not paid as above,		97 $\frac{79}{100}$

"A review of all the circumstances justifies, in my opinion, the conclusion that, considering the nature and character of the work, prosecuted, as it has frequently been, amid all the disadvantages of sickness, of locality, and consequent interruptions, during the most important season of the year, the above prices can seldom have yielded more than the fair equivalent which is due to the enterprise and industry of the contractor."

The committee have sought, by these copious extracts from the reports of the United States engineers, to place before the House of Representatives, detached from minute and technical criticisms on the various works of the canal, the decisive testimony of these very competent, and, in all respects, disinterested and impartial judges of the *plan*, the *execution*, the *cost*, and *condition* of a great national work, towards the construction of which Congress have authorized the subscription of a million of dollars, and to which, they are invited, by numerous memorials, to afford further pecuniary aid. It may be proper to add, that two of those engineers, Colonel Abert and Captain McNeill, very largely contributed to the original survey of this canal, under the United States Board of Internal Improvement. In contrasting its *actual* with its *estimated* cost, it will next be shown, that while, in its construction, it bears a favorable comparison with any other similar work in America or in Europe, its cost, so far as it has proceeded, falls as far below the prior estimate of that Board, as it surpasses that of the two civil engineers, Messrs. Geddes and Roberts. In truth, the plan of the canal which has been constructed differs *essentially*, in its dimensions, from any, for which an estimate had been made, before its construction commenced. In this view, its cost sinks yet further, below the estimate of the United States Board of Internal Improvement. For sixty-four miles, it maintains, with scarcely a reduction any where, on account of peculiar obstacles, a greater breadth at the surface by twelve feet, and, for forty-two miles above, a greater breadth by two feet; it is throughout deeper by one foot, and its towpath and guard banks are broader at top by three feet than the corresponding dimensions of that canal, the eastern section of which the United States Board of Internal Improvement computed at $8,177,081 05; or, at a sum exceeding nine millions, if there be added the usual allowance for contingencies, and a reasonable estimate for land and water rights; for the exclusive instead of a very limited use of water lime, in very nearly all the masonry of the aqueducts, locks, and culverts; and the substitution of cut stone, for hammered faces, in the far greater part of the masonry of the locks.

It can scarcely be necessary to remark, that although, in certain situations, a broad, and, in others, a deep canal, and, under very peculiar circumstances, a canal both deep and broad, may be constructed at as little, or even less cost, than one of smaller dimensions; yet, on any line of great extent, the cost of a canal will be greatly augmented if its enlarged dimensions be maintained throughout, or very nearly so, as in the case of the eastern section of this canal. (Vid. App. G.)

Messrs. Geddes and Roberts estimated the cost of a canal between Georgetown and Cumberland, which should have the breadth and depth of the State canals of New York and Ohio, the cross section of which below their water line is but 136 square feet; their water surface being forty feet wide, their bottom twenty-eight feet, and their depth but four feet, at $4,008,005 28. But, in this estimate, they allow nothing for land and water rights, nor for the houses of lock-keepers and collectors, nor for the various locks which connect the canal and river, to favor the commerce of the Virginia shore. The trunks of their aqueducts are supposed to be of wood, their locks to be less in height by two feet, and in length by ten feet, and their culverts, more than two hundred in number, shorter, by twenty-six feet each, than those of the Chesapeake and Ohio canal. It is true, they include 158 bridges, which are dispensed with in the plan of this canal; but they compute their cost at but $200, where designed for public roads, and $150 for private, if a due allowance be made for those omissions and for those minor differences in the plans of the work estimated by those engineers, and of the work done, to say nothing of the superior size of the latter, their estimate should be enlarged by a sum not short of $600,000, *in any fair comparison of it, with the actual cost of the present canal:* the land condemnations and purchases for the 109 miles, now nearly completed, having cost (and the account is not yet closed) more than $171,400; the locks, averaging eight feet lift, and forty-five in number, $1,156 the foot lift, instead of $800, their estimated price; and the five aqueducts of stone arches on the same line the sum of $180,808 05 more than those estimates allow for their construction, with *wooden* trunks.

But another cause has, in a manner yet more obvious, swelled the actual cost of this canal beyond the estimate of those eminent civil engineers: the extension of the canal in length (vid. App. E.) from the upper boundary of Georgetown to the mouth of Tiber creek, in Washington, a work which, though not comprehended in their prior estimate, has cost not less than $350,000, exclusive of the purchase and condemnation of lands and lots, amounting to $65,000 more. Add to all those differences *in plan, construction, and extent*, between the work *executed*, and that *estimated* by Messrs. Geddes and Roberts, an adequate allowance for the enlarged dimensions of a canal, the cross section of whose trunk or water prism exceeds, by thirty-four square feet, the double of the cross section of their smallest canal, and their estimates will be found to correspond very nearly with the real cost of the Chesapeake and Ohio canal, though the eastern section of it be supposed to cost six millions. In allowing for the enlargement of the breadth of the estimated canal, for 126 out of 186 miles, from 40 feet, to 48, and 60 feet at the surface, and for the increase of its depth from 4 to 6 feet, those engineers undervalued the difference in the quantity and character of the additional labor to be exerted in their construction.

The contractors who first entered upon the Chesapeake and Ohio canal, undertook their work at prices very little, if at all, higher than those, which they had found to yield an adequate compensation, for similar labor, on the narrower and shallower canals of New York, Pennsylvania, and Ohio. The consequence was the ruin of several; though the far greater part of them, either very soon abandoned their contracts, or petitioned for, and obtained higher prices. Additional allowances were granted them until the inconvenience of changing the terms of the original contracts; and, above all, the danger to which it subjected the company, of imposition and fraud, induced the establishment of the rule, afterwards rigidly enforced, that no contractor should, under any circumstances, be allowed for his work more than the stipulated price. The effect of this precaution was, of necessity, to augment those prices in all the new contracts. (Vid. App. I.) Where the water prism of a canal is sunk in nearly level ground, so deep, that its water surface is even with the natural surface of the adjacent earth, every additional cubic yard of excavation required for the enlargement of the dimensions of the canal, must be carried so much farther, or lifted so much higher. Where this enlargement requires a canal to be *two feet deeper* and *twenty feet broader*, the *average price* allowed for the excavation of the smaller canal will furnish a very inadequate compensation for the extra quantity of materials of earth or rock to be removed from the larger; and yet more incompetent will be this average, provided the extra quantity be removed exclusively to one side of the canal; as is required, on this canal, with the view, in some places, to strengthen its defence from the current of the river, and, in all, to keep unobstructed, the access to the canal from the neighboring country, and to avoid, where practicable, disfiguring by spoil banks, or injuring, in any way, the adjacent lands.

It should also be borne in mind, in accounting for the excess of the cost of this canal, beyond even the highest estimate of Messrs. Geddes and Roberts, that, as far as the first twenty miles, its depth was extended from five to six feet water, after the contracts had been formed for its construction, and its levels had been adjusted to the depth first contemplated; a measure which, however urgently recommended, by considerations of public economy, could not fail to enhance the cost of the various works. Besides its unavoidable effect in augmenting the quantity of masonry, by adding a foot to the depth of each lock chamber, and to the height of the parapet walls of each aqueduct, it required, in some cases, not only the pits, but the abutments of the culverts, to be sunk a foot deeper, to clear a passage for water, beneath the canal, sufficient to vent it. Moreover, the long level below the last access to the river, at the head of the Little Falls, underwent a still greater enlargement after that estimate had been made, in compliance with the express condition of the subscription authorized by Congress, which had for its object, besides furnishing water if needed, for canals, to the navy yard, Alexandria, and Annapolis, to allay the inquietude of Baltimore, lest an adequate supply of water, at the required elevation in Georgetown, (vid. App. K.) should not be furnished to the "Maryland canal." For the construction of the last named work, a charter had been granted, with a liberal subscription of stock, by the General Assembly of that State, with whom it was once a favorite project.

But if the canal which has now been in part constructed on a highly improved plan, shall be ultimately found, for that reason, to exceed, in cost, the estimate of the largest of the three canals described in the report of Messrs. Geddes and Roberts, it will appear, without any allowance for its superior dimensions, and its substantial and faithful execution that its cost falls far below, and with such allowance, at least $3,000,000, or 33⅓ per cent. short of the estimate of the United States Board of Internal Improvement.

It is now ascertained that the cost of the first 109 miles of the Chesapeake and Ohio canal, will reach $3,760,000, (vid. App. E and H,) exclusive of the exorbitant sums allowed by juries, to the proprietors of land and water rights, occupied or destroyed by the canal; of the cost of that incessant litigation, by which the company has been harassed; and of the usual allowance on all such works, for those contingencies, which comprehend printing, advertising, postages, and the much heavier items of salaries or compensation to officers, engineers, and other agents, along with the rent of offices and furniture, instruments, &c. &c.; for which, ten per cent. is usually added to the estimated cost of a canal; an allowance seldom found to exceed, very far, the actual expenditure. As none of those items are embraced in the estimate made by the Board of Internal Improvement, so they are also excluded, from the comparison which is here instituted between their estimates and the actual cost, so far as it has proceeded, and the probable cost estimated by that standard, of what remains to be done, of the eastern section of the canal.

But there should be added to their estimate, the sum actually expended in extending that section two miles below their proposed termination of it, being the distance from the market-house in Georgetown, to the mouth of Tiber creek, in Washington, (vid. App. E,) and the extra cost attending the enlargement, beyond the narrowest dimensions which they at first contemplated, of that portion of the canal upon the Georgetown level, which is for a part of that level, in breadth, 70 feet; for a greater distance, 80 feet; and never less, even in the deep cut through the town, than 42 feet; and which, moreover, involved the construction of an extensive mole, including a tide lock, in very deep water; and the formation of a basin of eight acres, designed to serve as a harbor for the canal boats, while delivering or receiving their cargoes, at the end or the commencement of their voyage. This single item, however necessary, exceeds in cost, their estimate for a basin, by more than $60,000, as does the entire additional expenditure five times that amount, after all reasonable deductions. To the sum of $5,560,000, thus added to the actual, beyond the estimated cost of this section, by the extension of its works to a lower termination, should be also added, as in the comparison instituted with the subsequent estimate of Messrs. Geddes and Roberts, a due allowance for the extension of the breadth of the canal above the Little Falls feeder, from 48 to 60 feet, at the surface; of its depth, from five to six feet; of the surface of its towpath, from nine to twelve; and its guard banks, from five to eight feet; in relation to which, it is deemed unnecessary to repeat the remarks already applied to the estimate of Messrs. Geddes and Roberts. It is confidently believed, however, that after deducting the sums allowed for fencing and bridges in the prior estimate of the United States Board of Internal Improvement, the addition of at least three-fourths of a million of dollars to their estimate, would be required, to establish a just comparison between that estimate,

and the actual cost of the Chesapeake and Ohio canal. If this addition be made, the excess of the estimated above the actual cost of the eastern section of the canal, without any allowance for land condemnations or contingencies, will extend to very near or quite the sum of three millions of dollars."

Whatever, in actual cost, the canal may appear to have saved, from the substitution of ferries, pivot bridges, and viaducts beneath it, for the very numerous and inconvenient permanent bridges, 79 of which are comprehended in the estimate of the Board, at but $28,700 cost, has been more than counterbalanced, by the actual price of the substitutes for them already described; the economy of which results from the superior accommodation that they afford to the neighboring proprietor, and the public, as well as to the passenger on the canal; and from the absence of the necessity of future repairs or the entire renewal of its most perishable appurtenances.

The cost of *extra fencing*, extending in the estimates to 175 miles, and computed at $157,500, has been paid, on the purchase or condemnation of the lands taken for the canal, to the proprietor, who is bound for its future repairs. It is with a due consideration of these and other circumstances, that the above balance is struck, between the estimated, and the actual cost of the eastern section of the Chesapeake and Ohio canal.

If any doubt, therefore, shall remain of the accuracy of this comparison, and its declared result, it must attach to the expected cost of the part of this section of the canal not yet placed under contract.

For the cost of the 26½ miles of it, however, lying below the mouth of the Big Cacapon river, a standard has been very recently furnished by a survey, location, and *working* estimate, preparatory to contracting for its construction.

This standard is supplied by a competent resident engineer, assisted by an experience of five years, on the part of the canal already completed; and is entitled to the fullest confidence.

Mr. Cruger's estimate (vid. App. L) embraces the usual allowance for contingencies, and computes the cost of these 26½ miles at $25,000 per mile. Applying the same standard to the 53½ miles which will remain to be constructed, above Cacapon, in order to reach Cumberland, the cost of the part of the canal not yet placed under contract will be $2,000,000; which, added to the actual cost of the part below, will extend the entire cost of the eastern section to $6,000,000. This result is attained after a due allowance for all extra or contingent expenses: some of which, the experience of five years, and the increasing favor of the public, towards an enterprise which has, now, no enemies, will enable the President and Directors greatly to reduce. Such will, undoubtedly, be the result, in relation to the expense of the engineer department, of lawsuits, of printing, and, it is to be hoped, if not confidently expected, of land condemnations; since the benefits to be derived from the canal, which the juries are required by the charter to compute, in assessing the damages of each proprietor, must be much *more apparent*, as the canal is brought into active use, and extended to a country very remote from market.

But if, after all the facts here stated, and the reasoning already adduced, there shall exist, in the most prejudiced mind, the least doubt of the economy of the actual, contrasted with the estimated cost of this canal, by the United States Board of Internal Improvement, which was once so near

arresting its progress, and may yet discourage its friends, the following undeniable evidence is offered.

It is drawn from a laborious and careful comparison of the quantities and cost of the various species of work computed by them, in the several subdivisions of their canal, between a point eight miles above Williamsport, and the lower end of their tenth subdivision, ending at the old locks of the Potomac Company, near Georgetown, with the ascertained quantity and cost of the same species of work in the canal now constructed.

In the distance of 103 miles, the number of cubic yards of excavation and embankment, and of perches of dry masonry, on the two canals, is found to be as follows:

	In the estimate of the Board of Engineers.			*In the canal nearly constructed.*		
	Cubic yards.		Cost in dollars.	Cubic yards.		Cost in dollars.
Of excavation,	5,885,814	at	1,429,651 94	5,922,490	at	1,211,300 41
Of embankment,	1,723,816	at	441,207 00	3,028,708	at	536,866 32
Perches of dry walling	527,456	at	1,575,920 00	412,093	at	220,710 01

So that, while the quantity of excavation, on the larger canal, exceeds that on the smaller, by 36,676 cubic yards, the cost of this item in the former falls short of its estimated cost in the latter by $218,331 53.

Although the quantity of embankment, on the larger canal, exceeds by 1,304,892 cubic yards, or three-sevenths, being more than 40 per cent. that on the smaller canal, the difference in the aggregate cost of this work, on the two canals, is but little more than 20 per cent.

The average cost of excavating every sort of earth and rock, on the 48 feet canal, is computed at $24\frac{45}{100}$ cents per cubic yard; while the actual average price of the same work, on the broader and deeper canal, averages but $20\frac{4}{5}$ cents per cubic yard.

The estimate of the cost of the embankment on the former will be found to average $25\frac{51}{100}$ cents per cubic yard; its cost, on the latter, is but $17\frac{72}{100}$ cents per cubic yard: the two proportions being nearly as 4 to 5 and 2 to 3, in favor of the larger canal; and this, too, in relation to the most common items of expense, occurring in the construction of every canal. If those proportions be compounded, the relative cost of the cubic yard of excavation and embankment on the smaller and larger canals, will be as $19\frac{53}{100}$ cents to $24\frac{58}{100}$, or near 4 to 5, in favor of the broader and deeper canal.

A much more favorable proportion than this, for the 60 feet canal, will be found to pervade the estimated and actual cost of the dry masonry of the two canals; the estimated average price of walling on the 48 foot canal, is $2 98 per perch; the actual price per perch, of the walls of the 60 foot canal, exclusive of inside paving, is $53\frac{56}{100}$ cents, affording a ratio of near $5\frac{1}{2}$ to 1; and an aggregate difference in favor of the 103 miles of canal, to which this ratio applies, of $1,355,210 99.

In the masonry constructed with hydraulic cement a like disparity exists, though to a much less extent, in favor of the actual canal.

Supposing the substitution of *cut* for *hammered face stone* in the ashlar of all the lift locks, the exclusive use in practice, for the very limited *estimated use* of water lime in their cement, and the addition of one foot to the breadth and depth of each lock, to counterbalance the difference in the plan of their foundations, where those are not sunk, as in many cases they have been, deep in solid rock, and the reduction of the length of their chamber from 102 to 100 feet, the estimated, compared with the true cost of 45

lift locks, is as 1,500 dollars to 1,156, making a difference of cost, in this item singly, of 123,840 dollars.

If a similar difference does not exist in favor of the work done, and that estimated, in relation to the culverts, it results from the greater length, breadth, and height given to those upon the constructed canal, than in the estimates for the smaller, in order to adapt them to a canal of greater breadth with thicker banks, and to fit many of them to be used as substitutes for permanent bridges or ferries.

The five aqueducts on the larger canal have cost $249,400. The estimate of them, by the Board of Internal Improvement, was $275,827. The most costly masonry on the whole line of 103 miles is that of the Monocacy aqueduct, a work not surpassed, in strength or appearance, by any in America. Its cost, per perch, is less than its computed cost, though its aggregate much exceeds its estimated cost. The estimate of the board of engineers allows $99,000 dollars for an aqueduct across the Monocacy, 120 yards long, consisting of 8 arches, each of 30 feet span. The aqueduct, now erected, consists of seven arches, of 54 feet span each. It is 540 feet long, and its length is not found to be too great, for the river whose breadth it subtends.

Having, as they trust, sustained the proposition, that the actual cost of the Chesapeake and Ohio canal has fallen very far short of that particular estimate which they have last reviewed, the committee, in justice to the able authors of both the preceding estimates, admit the difficulty of instituting and sustaining a correct comparison, between the first estimates, however minute they may be, as in the present case, and the actual cost of any canal. That the computed, usually turns out to be less than the actual cost of all such works, is universally known; and for that, among other reasons, the economical construction of this particular canal cannot be questioned.

It is due to the late Board of Internal Improvement, whose zealous labor contributed so essentially, to further the success of this great enterprise when it much needed public favor, to remark, that no two engineers, in separately estimating the same work, were ever found to agree in their prices; that successive examinations lead, often, to great improvements in the most important office of an engineer, the judicious location of a canal; and the quality of the work contemplated, in any previous estimate, may, and very often does differ, most essentially, from that of the work executed.

Messrs. Geddes and Roberts computed the cost of the five aqueducts last mentioned, at but $58,600, which is less than a moiety of the actual cost of one of them; and in the final location of the Chesapeake and Ohio canal, through a space not exceeding ten miles, a sum not less in amount, than $200,000, was saved by transferring the line of canal, from the base of the river cliffs, to a level fifty feet above, on the high and comparatively smooth surface stretching back from their summit.

The probability that the residue, about seventy-eight miles of the eastern section of this canal, can be completed for $25,000 a mile, has been rested, in an earlier part of this report, upon the working estimate, which accompanied the late definite location of a line of twenty-six and a half miles of it prepared for construction. It will be confirmed, by referring to the annexed tabular statements of the actual cost of the last forty miles placed under contract above Harper's Ferry. This part of the line will have been finished under many disadvantages, for about the price

before mentioned; although it comprises two elevated dams, at a tenth, and the masonry alone of its locks, aqueducts, and culverts, exclusive of its dry walls, makes up a third of the remaining nine-tenths of its total cost. Among its sections, also, are to be found, notwithstanding its reduced breadth, some of the most expensive on the whole line of one hundred and six miles, having their foundations in deep water, and passing along the face of perpendicular cliffs of solid rock, with embankments formed of earth brought, of necessity, from the opposite shore of the river, over temporary bridges.

Experience having now shown that, except in very peculiar situations, external walling may be safely dispensed with, where a sufficient quantity of loose stone is furnished, from the excavation, to supply an effectual cover to the exterior bank of the canal, this item of expense, which, on the eastern section alone, was, by the United States Board of Internal Improvement, computed at $2,737,808, and on the entire canal, at as much as $6,634,975, will rarely, it is presumed, occur hereafter.

All these considerations co-operate with the reduction of the canal to a breadth of fifty feet at the surface, to induce a very confident belief, that preserving, in all other respects, its enlarged dimensions, and substantial and durable structure, the residue of the eastern section may be completed for two millions of dollars; a moiety of which sum, it has been proposed that the United States shall subscribe; the Legislature of Maryland being expected, it is understood, in that event, to supply a part, if not the whole of the residue; and there being every reason to believe that Virginia would, under such circumstances, enlarge her subscription, if necessary, to the extent of any possible deficiency.

Such deficiency might, moreover, if it occurred, be abundantly supplied by the resources and credit of the work itself. The Supreme Court of the United States, at its last term, put forever to rest, the claims of certain individuals, under the charter of the old Potomac Company, to the surplus water of the canal; and Maryland, in her act to compromise the late dispute between the Canal and the Baltimore and Ohio Railroad Companies, concurred with Virginia, in enlarging the power of the Canal Company over the surplus water of the Potomac river; the natural highway, as well as the common subject of jurisdiction of those States. To the sale or rent of a vast water power, the company may add, the augmented revenue of the canal itself, the navigation of which will have been extended, within the compass of a single year, from twenty-two, to one hundred and nine miles, besides the added navigation of ten miles of slack water, above its remotest feeder.

What the total revenue of the Chesapeake and Ohio canal may be, at some future day, the committee proceed to inquire, in order to complete the purpose, with which, this report was begun.

From the Treasurer's abstract of the receipts and disbursements of the company, down to the 31st of December last, it appeared that the revenue from tolls, at that date, amounted to the sum of $94,538 27. This sum included a very inconsiderable amount which was received, after the opening of the entire line of sixty-four miles, below the head of Harper's Ferry falls, in October last; the water having been speedily drawn off, to enable the contractors to complete the graduation of the part of the Baltimore and Ohio railroad, at the Point of Rocks.

The first tolls collected by the Canal Company, were received in August,

1828, after the surrender of the charter of the Potomac Company; but from that date, until October last, only twenty-two miles of the canal had been, at any time, navigable; and the rate of toll charged by the former company has remained unaltered till within the last month; except on a single article, rough stone, on which, it was reduced, soon after the opening of the canal below the Seneca feeder.

To arrive at the nett income of the company, for the above period, the charges for lock tenders, collectors, and repairs, should be deducted from the gross proceeds of the tolls.

The two first of those charges had amounted, on the 1st of January last, in a period of near five years and a half, to $9,831 75.

The repairs, except such as have had their cause and extent specially reported, according to a standing rule of the canal board, requiring a particular account to be rendered of every breach of the canal, have been hitherto, so blended, in the mode of making them, with the necessary improvements of the works for which final estimates had been given to the several contractors, that it is not possible, with any precision, to estimate them separately.

There had been expended on the above accounts, and charged in the Treasurer's monthly abstract of the 31st of December last, under the general head of "construction of the canal," $82,604, of which, $26,919 90 only had been expended for *specific* repairs, in the whole period which has elapsed, since the opening of a part of the canal in October, 1830.

A minute examination of this account would, however, show that the annual cost of repairs has been regularly declining, as the heavy embankments and walls of the canal have acquired stability, from time, and the improvements suggested by experience.

No breach has occurred, in the twenty-two miles of canal first opened, for a period of more than eleven months; and but two, on the line of forty-two miles which was opened in October last, and is now in use. The peculiar natural obstacles encountered on the first twenty-two miles, between Georgetown and Seneca, could not be overcome without exposing the canal to some hazard on the admission of water; the character and extent of which, time alone could disclose, and persevering industry effectually guard against.

In the construction of walls and embankments having their base, sometimes on stratified rock, and often in the bed of the river, and for considerable distances, elevated more than 50 feet above the ordinary height of a bold current, no human care could secure absolute perfection. It has been the work of experience, as well as vigilance, assisted by labor and capital, to supply its place.

The annual charge on the gross revenue of a canal, arising from the wages of lock tenders, and the salaries of collectors, it should be considered, is an almost unchangeable amount, dependent on the number and relative position of its locks, and on its length and intersection by other channels of communication; while its tolls increase with the use of its navigation, and that, with the development of the resources of the country whose commerce it facilitates.

The Erie and Champlain canals of New York were begun in 1818, and opened throughout in 1823; since which periods, their tolls have increased, from the inconsiderable sum of 5,437 dollars, received in 1820, to $1,422,695 22, their amount for the last year. (Vid. App. M.)

The coal trade, alone, of the Schuylkill Navigation Company of Pennsylvania, has risen, in nine years, from 6,500, to 252,971 tons; and its tolls, levied on that single commodity, from 9,700 dollars, to 228,138 dollars. (Vid. App. N.) From these facts it is manifest, that the future revenue of the Chesapeake and Ohio canal cannot be inferred from its past receipts on twenty-two miles, only, of its expected extent.

Like other channels of trade and intercourse, it must reach the country, whose resources it is designed to bring into active use, before it can become profitable to its stockholders, or give life and animation to the markets in which it terminates. Its most sanguine friends have never hoped for themselves, nor promised to the public, a remuneration for the expense of its construction, before it shall have entered the lumber and coal region, above the mouth of the Great Cacapon; nor will the full fruition of the benefits, which it offers to them and to their country, be realized, till this channel of trade and intercourse shall have arrived at its destined limit, in Pittsburg.

Very few, if any canals, that have been hitherto constructed, would have yielded any profit whatever on their stock, if their trade had been limited to the commerce of the country which they penetrate, at the period of their commencement.

The most profitable, if not the only *very profitable* canals in Great Britain are those, which derive their chief revenue from the carriage of coals: a revenue, in most cases, created by the canal itself. The celebrated canal of the Duke of Bridgewater, which connects the Worseley coal mines with Manchester and Liverpool, was begun exclusively for that purpose; and it is believed, that no canal, in England or Scotland, made for the transportation of coal, has failed to yield a profitable return on its capital. This arises, as well from the consumption of this mineral in so many useful arts, of which it is the *primum mobile*, as from the very obvious fact, that the weight of the fuel which any family annually consumes, in any temperate or high northern latitude, exceeds, very far, the aggregate weight of all the other commodities required for its support and comfort.

In a country where extensive forests no longer exist, those canals which supply limestone, and lime for building and the wants of an improving agriculture, will rank next in profit. The metals, and especially the most valuable of them all, iron, in its crudest form, and in all the various stages of its manufacture, will be found, where it abounds near the margin of a canal, to constitute, next to mineral coal and limestone, the source of its greatest profit. Where all these sources of revenue are to be found on a canal, in quantities inexhaustible, and directly co-operating towards their mutual consumption and use, such canal will have a decided superiority over any three canals, on each of which, one only of those commodities exists, although each may be profitable to its stockholders.

On the most profitable canals of America, lumber in all its forms, and the rudest production of the forest, firewood and bark, enter largely as a source of revenue, supplying, as on the Erie canal of New York, the place of coal and iron. Where all those commodities abound on the same line of canal, its revenue from them will depend, in some degree, upon their relative distances apart; since the profit to be derived from the tolls chargeable upon them, will be proportioned to the spaces through which they are carried, in their heaviest and rudest form—the coal before it is coaked; limestone, prior to its calcination; the ore, as dug from its bed; the tree, as it lies felled by the axe.

However profitable, therefore, may be many of the canals of Europe, it is erroneous to suppose that such improvements are better adapted to a manufacturing and highly commercial country, than to one rising to cultivation from the shade of its primeval forests. The approximation of the tonnage of the United States towards that of the most commercial nation in Europe, arises from the very large proportion, in size and weight, that its heavy and bulky commodities bear, to those, which, in a highly improved condition of the arts, comprise the wages of ingenious labor, and the profits of large capitals, in very reduced dimensions.

These preliminary remarks will prepare an unprejudiced mind for the ready conception of the vast extent of the revenue, which may be confidently anticipated, from the Chesapeake and Ohio canal, when it shall have reached its ultimate destination. Its eastern section, singly regarded, passes through, and terminates in, a country eminently distinguished by the possession of all the resources that contribute to swell the income of the most profitable canals in Europe or America. Sandstone of the most desirable quality, such as may be seen in the front steps of the Capitol, is obtained on the side of the canal, at the distance of twenty-four miles from its eastern termination. Soapstone and granite, from the intermediate space. Within the first forty miles, its channel is sunk in the very bed of the quarry, which supplied the beautiful marble columns of the hall of the House of Representatives. Limestone of all qualities, from that of the coarsest grain, to the finest statuary marble, including many varieties of color; and hydrates of lime suited for water cement, are to be found in the first seventy-five miles. After entering the limestone region, which borders the canal, for more than eighty miles, at the distance of fifty from Washington commence beds of iron ore, once profitably worked, but long since abandoned for want of fuel. Passing the head of Harper's Ferry falls, the canal washes the base of an ore bank, and runs directly opposite to one in Virginia, yielding a very profitable return at the large iron manufactory of Antietam, notwithstanding the proprietor is exposed to the disadvantage of paying twenty cents a bushel for the coal which he consumes, after a transportation of more than one hundred and forty miles, by an obstructed navigation. Mines of iron ore of excellent quality have been discovered, at various intervals, on the residue of the line of canal, as high up the valley of the Potomac, as the base of the Alleghany; where very rich fields of bituminous coal are found, on the margin of the river, as well as in the vicinity of Cumberland. (Vid. App. O.)

After passing the cultivated country, between the mouth of Monocacy, and the foot of the North mountain, including the fertile valley of that river, and the much more extensive valley of the Shenandoah, along with that of the Antietam and of the Conococheague, the canal will, on reaching the Cacapon feeder, at the distance of one hundred and thirty miles from Washington, after passing below a large field of anthracite coal, enter the most extensive lumber region in America. It may be regarded, as extending from the North mountain to the Alleghany, a distance of one hundred miles, if measured by the canal, and as stretching, laterally, to the head of the practicable navigation of the numerous tributaries of the Potomac.

The Chesapeake and Ohio, unlike the Erie canal, traverses, for a great part of its way, one of the most broken countries in the United States. By its eastern section it penetrates, and by its western passes through the broadest belt of mountains on this continent.

This belt spreads to the east and west, from its highest elevation, to the Blue ridge and the Laurel hill; occupying a space of not less than one hundred and forty miles in breadth.

Within these natural limits, and an east and west line extending to the north, midway between the Juniata canal and the Potomac, and a parallel boundary near 200 miles to the south, between the head waters of the James and Shenandoah rivers, are comprehended, along with the geographical centre of the largest State of this Union in point of territory, and the most fertile and extended valley below the Alleghany, a vast forest overshadowing a surface exceeding 16,000 square miles; three-fourths of which, being inarable, will furnish an unfailing supply of lumber of every description, to the common thoroughfare of its productions, agricultural and mineral. Coal, both bituminous and anthracite, iron, and limestone, lie embedded below its diversified surface, in the vicinity of its numerous rivers and creeks, which afford, at high water, in their natural state, a navigation of five hundred miles, capable of being rendered, by the simplest improvement of art, as permanent, as that of the canal, into which, they will pour their abundant supplies.

Of this navigation, the Shenandoah and its branches, alone, afford two hundred, the South Branch one hundred, and the two Cacapons eighty miles.

The Opeccon has been surveyed for the purpose of rendering it navigable as far as the chief town of the county of Berkeley, and is susceptible of similar improvement, up to the vicinity of Winchester, in the county of Frederick, one of the largest inland towns of Virginia. The Antietam and Conococheague rising in Pennsylvania, and traversing the whole extent of the fertile county of Washington, in Maryland, could be made, at little cost, to add fifty miles to this navigation.

Below the Blue ridge, an improvement of Goose creek, and of the Great Monocacy, it has been ascertained by a careful examination and survey, would extend this navigation seventy miles farther, into the county of Fauquier through that of Loudoun, to the south, and through the most populous county of Maryland, to the Pennsylvania county of Adams, to the north of the Potomac.

The various dams already erected, across the channels of the last four of these streams, afford facilities for reducing the cost of their navigation, while the numerous mills, and other manufactories on their banks, will amply repay, by a reasonable toll upon their imports and exports, the capital expended on their cheapest possible outlet to market. The improvement of the Shenandoah has long been confided to an independent company. A charter for the improvement of the navigation of Goose creek, has been recently granted by Virginia: and one to improve the Monocacy, by Maryland.

An authority to render navigable the rivers of Frederick and Washington counties, was early vested, by the Legislature of Maryland, in the late Potomac Company. It passed on the surrender of their charter, to their successors, the stockholders of the Chesapeake and Ohio Canal Company; who have unanimously consented to transfer this authority, to any new associations that may be formed, for the improvement of their navigation.

Pennsylvania has granted an act of incorporation, for the improvement of the Conococheague; and is deeply interested in the construction of all the northern branches from the eastern section of a canal, which will shortly pass, through the town of Hancock, within a mile and a half of her southern border.

There are mills on the head waters of the James and Shenandoah rivers within eight miles of each other, and no mountain separates them. Whether these rivers can be united by a canal, remains to be determined.

The Monocacy, especially, derives additional importance from its copious and gentle current; the fertile country on its banks; and the near approach of its head waters to those of the Conewago branch of the Susquehannah, with which, it has been reported practicable to connect it, by a continued canal, striking that river very near the entrance of the Union canal; by which, and the "Schuylkill navigation," an inland water communication of two hundred and eighty miles, wholly independent of the Chesapeake bay, would be opened with the market of Philadelphia, and one of a hundred and forty miles, with the seat of Government of Pennsylvania. By the State canals and portage railroad of this enterprising commonwealth, an inland navigation, with the exception of thirty-six miles of railway, would then exist, between Washington and Pittsburg, less in extent, by twelve miles, than that which unites the latter, by the Union canal and the Schuylkill, with the city of Philadelphia.

Such are some of the characteristic features, the resources, and facilities of internal navigation, of the extensive country bordering on the eastern section of the Chesapeake and Ohio canal, all of which naturally seek an outlet to the ocean by the channel of the Potomac; but, to which, the Baltimore and Ohio railroad, at the Point of Rocks, presents a choice of the third market in America, and, through it, a ready access to all the markets of the world.

The committee have shown that the Chesapeake and Ohio canal has upon its borders, and on those of the various tributaries of the Potomac, coal, limestone, iron, and lumber; that these several commodities exist, to an almost boundless extent, and under the most favorable circumstances for yielding profit to the canal which transports them, and which, cheapening the freight of their transportation, by its enlarged dimensions, secures alike to the rude material, and its manufactured product, the advantage of a favorable competition in the domestic, as well as foreign market of consumption. Here they might end this branch of their inquiry.

But a standard to measure the future revenue of this canal, although by no means perfect, yet approximating the truth, more nearly than any other that can be devised, may be derived from the actual profits of similar works, with a proper discrimination of the peculiar circumstances which affect their incomes, including an examination of the various sources from whence it accrues.

The two most profitable lines of artificial inland intercommunication in America, are the Erie canal of New York, and the Schuylkill navigation of Pennsylvania. The stock of the latter, though once much below par, was selling, prior to the late declension of all the American markets, at from 128 to 130 dollars for 50 dollars paid. No similar measure exists of the value of the New York canal, since it is the property of the State. Various calculations have been made of the original cost of its construction, and its tolls are subject to such modifications as the pleasure of the Legislature may give them. Of its tonnage, no public account is given for the last year. From a report of a former committee of this House, it appears that its descending tonnage amounted, in the year 1826, to 269,795 tons, of which 150,226 tons, being more than a moiety of the whole, consisted "of sawed lumber, timber, shingles, staves, and cord wood; to which might be added," say the committee, "in estimating the contribution of the forests of New York

to the revenue of the canal, 7,681 tons of ashes; leaving the portion of the descending tonnage composed of all other commodities, less than 112,000 tons." (Vid. Rep. No. 141, of February 11, 1828.) Of this, "flour, wheat, coarse grain, 'and provisions,' furnished all but 30,000 tons; and of the residue, domestic distilled spirits, stone, bricks, and lime, more than a moiety. Of the small remainder, since the discovery of water lime, in abundant quantities, on the eastern, as well as on the western section of the Chesapeake and Ohio canal, there is but a single commodity which that canal is not known to supply. Salt will be furnished, to the latter, from the Youghiogeny, where it exists in abundance, alongside of the coal which facilitates and cheapens its manufacture, and consequently its price to the consumer." Gypsum, alone, remains to be discovered on the Chesapeake and Ohio canal, to assure to it every source of revenue which the Erie canal derives from the adjacent country. Of the ascending tonnage of the Erie canal, in the year 1826, only 28,000 tons out of more than 300,000, or less than one-tenth, being of merchandise, could be ascribed to the extensive foreign trade of the city of New York; and but 27,000 dollars of a revenue of 687,000 dollars, being less than five per cent. of its total amount, was derived from the western extreme of that canal, or the lakes.

In neither the ascending nor descending tonnage, did there appear, in the table of the collector of West Troy, at the junction of the Erie and Champlain canals, which had then been six years in use, any one of the following commodities; iron, coal, marble, or salted fish, except the first; and, of that, not a pound of bar iron or castings, and less than 1,000 tons of pig, doubtless from Lake Champlain.

The manufactured iron, in bars or castings, required for the consumption of the interior, was included, it is presumed, under the general denomination of merchandise. Notwithstanding those deficiencies, if a just computation be made of the original cost of the Erie canal, by excluding the annual interest paid on sums borrowed for its construction, the receipts of 1826 amounted to very near or quite 9 per cent. upon the capital actually vested in that noble enterprise.*

Its tolls for the year 1833 amount to $1,290,163 20, being the receipts of eight and one-third months. But 9,623 dollars were collected in the first ten days of December last; on the 11th of which, the canal was closed at Albany.

Notwithstanding the augmentation, by near 100 per cent., of the tolls of this canal, in the lapse of seven years, among the various commodities which passed Utica, in 1833, there were but 808 tons of iron, and 2,867 tons of coal. Within this period, the quantity of merchandise, passing by the same point, has been much more than doubled; that, of the last year, embracing 70,248 tons.

Its total tonnage, as in the year 1826, consisted chiefly of the produce of agriculture and the forest; flour and wheat yielding, in 1833, 400,000 instead of 80,000 tons. Gypsum, so abundant along the margin of the New York canal, afforded but 9,000 tons, or but a third of the quantity which ascended the Schuylkill, from Philadelphia, in the same year.

The tonnage of the coal, alone, (600,000 tons,) raised in Pennsylvania, and transported, in the last year, by three channels of improved navigation, the Schuylkill, the Lehigh, and the Hudson and Delaware, in their

* Mr. Clinton computed the cost of this canal at 23,000 dollars: the canal commissioners after his removal from their board, at about 18,000 dollars a mile: in the former sum, interest on the canal loans was embraced.

aggregate length, not much exceeding two-thirds of the Erie canal, approached very near the entire tonnage of the commodities, which passed Utica, in the same period.

The rapid growth of the western part of New York, a consequence of the opening of the Erie canal, has caused, in the progress of seven years, a very striking change in the relative proportion of its tonnage from the two most fruitful sources of its revenue, agriculture and the forest. A more than fivefold increase of the former has elevated it above the latter; an effect resulting, doubtless, in part, though, to what extent, no public report has demonstrated, from the agricultural exports of Ohio, since the completion of the great canal of that flourishing State.

As the agriculture of New York encroaches upon its forests, the canal revenue derived from the latter will gradually decline, and may ultimately, at no distant day, disappear. The income from lumber, and its associate productions, boards, staves, shingles, firewood, and ashes, will then be restricted to importations, for home consumption, through the lakes, or the Atlantic.

In process of time, the growing population of this State will overtake her agricultural supplies of subsistence, and the surplus productions of all her lands, stock, and labor, will assume the condensed form of manufactures; augmenting greatly her general wealth, and the value of her internal commerce, but adding very little, if at all, to the tonnage of her great thoroughfare.

Its tonnage may be, indeed, greatly diminished, unless imported coal, or iron, or both, shall supply the place now occupied by exported lumber and grain. This will not be deemed an unfounded conjecture, by those who, turning to the last two semi-annual reports of the Liverpool and Manchester Railroad Company, shall perceive that the entire receipts of that road, for the last half year, exclusive of the revenue derived from the transportation of persons, were drawn from 92,247 tons of merchandise, and 40,000 tons of coal: the former being, when doubled for the year, less than a moiety in amount, of the tonnage supplied to the Erie canal by agriculture alone, in the same period.

This tonnage includes, not only all the merchandise which passed between the towns, at the two extremes of this road, but 28,000 tons from its intermediate branches.

How short a distance on this road, thirty-one miles only in extent, the 40,000 tons of coal must have been carried, the inconsiderable nett revenue of £1,511, derived from that source, sufficiently manifests. Its toll of four pence or eight cents per ton, per mile, for the transportation of other commodities; and at the slowest speed, in open carriages, a penny halfpenny, or three cents, and in the swiftest and best carriages, two pence halfpenny, or five cents, for each passenger, reconciles the fact of the very limited tonnage of this road, limited, considering the magnitude of the cities which it unites, and the vast foreign trade of Liverpool, to the declared dividend of $8\frac{2}{5}$ per cent. for the last year, on the sum of £1,080,000, expended on its construction, and necessary appendages.

Were the comparison instituted between the actual receipts of the Erie, and the future revenue of the Chesapeake and Ohio canal, extended through both sections of the latter, to its termination at Pittsburg, the views here taken of the probable superiority of the tonnage of the latter would be confirmed, rather than impaired. The superior dimensions of

the one, having been demonstrated by the United States Board of Internal Improvement, (vid. App.) to make up, in economy of time, and expense of transportation, for the greater elevation which it has to surmount. Those dimensions having been since considerably enlarged, that superiority has been extended from 58, to 71 per cent.; thus amply atoning for the greater cost, thence resulting, of the larger canal; and leaving both works to rest, for a correct comparison of their relative advantages, upon other discriminating circumstances.

The committee having determined to make a separate report on the western section of the Chesapeake and Ohio canal, forbear, for the present, to add more than a brief exposition of the relative advantages to New York, herself, for an intercourse with the Ohio and the lakes, by these two lines of intercommunication. By the Hudson river, the Erie canal, the navigation of the lake, the transit of fifteen miles over land to Waterford, on French creek, and the descent of that creek and the Alleghany river, the city of New York is, now, distant from Pittsburg seven hundred and eighty-five miles; and the want of uniformity in this chain of connexion creates the necessity, after stowing a bale of merchandise in a sloop, at New York, of four transhipments, viz. at Albany, Buffalo, Erie, and Waterford; and encountering, for 82 miles, the dangerous navigation of the lake, exposed to storms at all times, and in a war with Great Britain, to hostile fleets.

Since the completion of the Delaware and Raritan, and the Delaware and Chesapeake canals, New York is connected with Baltimore, by a line of inland navigation not exceeding two hundred and twenty miles, susceptible of use, by a steamboat of one hundred tons burden; and should the Maryland canal be hereafter constructed, as can scarcely be doubted, the same boat, after the completion of the Chesapeake and Ohio canal, may, by renewing its voyage, reach Pittsburg, at the end of three hundred and eighty-seven miles from Baltimore, and six hundred and seven from the city of New York; thus saving one hundred and seventy-eight miles of transportation, and four transhipments. With two transhipments, the same result may be accomplished; provided the railroad from Baltimore to Washington shall supersede a future resort to a canal communication between those cities, and the place of the contemplated tunnel, and numerous locks through the Alleghany, be supplied, by inclined planes and a portage railway. (Vid. App. P.)

Extending this comparison one step further, so as to embrace the entire purpose of the convention in which the Chesapeake and Ohio canal originated; a connexion between the Atlantic and the Western lakes; and regarding Detroit as a point common to the Northern and Southern routes, it will be found that the latter offers to the great and growing emporium of American commerce, a connexion with the Northwestern lakes, somewhat longer, it is true, than that by the Erie canal, but attended with this peculiar advantage, that in consequence of the action of the Spring winds on the floating ice and current of Lake Erie, and the milder climate of the South, it will be capable of use near four weeks earlier in every spring, and a fortnight later in ever autumn, than the route by Buffalo.

The line of improved navigation, in America, the capital stock of which commands the highest price, is that which derives its present tonnage, from sources identical with those of the Chesapeake and Ohio canal.

The income of the Schuylkill Navigation Company, since their first reception of tolls, in the year 1818, supplies numerous details confirmatory of all the principles relating to the revenue of canals, which have been comprehended in this report. (Vid. App. N.)

The Schuylkill rises on the eastern border of the great belt of mountains common to Virginia and Pennsylvania. Its length is, therefore, much shorter; it drains a much less extensive country, and discharges much less water than the Potomac. Although connected with the Union canal, it has in fact no large tributary. Its improved navigation accommodates, however, a territory alike diversified with that of the Potomac in soil, and productions, agricultural and fossil. Its tonnage, the result of its improvement, has been the growth of sixteen years; for seven of which, the revenue derived from it, did not exceed $2,000; although it comprehended, in the year 1833, 445,849 tons, yielding a gross income of $325,486 63. More than a moiety of this tonnage consisted of coal, which paid a toll of $228,138, exceeding two-thirds of the entire revenue of the Schuylkill Navigation Company, including $16,673, derived from the rent of surplus water.

Of the remaining 217,711 tons, limestone and lime yielded 65,494; gypsum 26,494; iron, in its various forms of crude, blooms, pigs, castings, bars, and nails, 25,786; and lumber, including wood and bark, 18,203 tons. Its gypsum alone, although imported from abroad, was within 1,500 tons of the quantity of merchandise carried up the Erie canal, in 1826. Flour and grain, which, in agricultural districts, are regarded as the main staples of internal trade, and the chief source of profit to the artificial channels by which they are transported to market, supplied on the Schuylkill, in the last year, notwithstanding that river descends to the second city of the United States, through a highly cultivated country, but 23,165 tons: or very little more than a twentieth of the entire tonnage of this very profitable navigation.

Its total length is 108 miles, or within a mile of the actual extent of the nearly completed portion of the Chesapeake and Ohio canal, exclusive of the basin of slack water above its highest dam. It consists, however, of but 62 miles of canals of various extent, united by 28 guard locks, with navigable ponds of slack water, formed in the bed of the river, by dams across its channel. These artificial ponds or basins are denominated pools, in the annual reports of the company, and constitute 46 of the 108 miles of navigation, connecting Philadelphia with Mount Carbon, in one of the three great coal districts of Pennsylvania. In its ascent, from the tide, this line of improved navigation, overcomes an elevation of 588 feet; which exceeds the elevation of the entire eastern section of the Chesapeake and Ohio canal. Its locks are 120 in number, of which 92 are lift locks, constructed of rough stone walls, lined with plank. These have been found, according to the last annual report of the directors, to "require a heavy outlay for repairs;" and for that reason, the report announces, that, while correcting another error in the original plan of this work, its President and Directors propose "in doubling the locks, wherever there is more than a single one, to construct the new locks of *cut stone*, with *hydraulic* cement." The wooden locks are 80 by 17 feet in their chamber, while those recently constructed of stone, are 80 by 13½ feet only; and among the advantages of this reduction of the breadth of the lock, the report comprises "the saving of water." One reservoir, 41½ feet deep, has been already provided; and another is contemplated, in order to supply a possible defect of water in a

part of this line of navigation. The report suggests that "by the doubling of the locks, more lock-tenders will be required;" and the number of the houses for their accommodation being, at present, but 65, a number exceeding very little that of half the locks, indicates that two or more locks have been frequently combined, in their construction, and placed under the care of a single attendant. The locks, both new and old, admit of but four feet depth of water, upon their mitre sills, and that is, consequently, presumed to be the depth, also, of the various canals; a depth which, combined with the length and breadth of the new locks, affords a construction of both, adapted to the use of boats of 40 tons, drawn by two horses, aided by two men and a boy; the complement of force, sufficient for propelling a boat of 100 tons, on the Chesapeake and Ohio canal.

The cost of this line of 108 miles of improved navigation has been, according to the last annual report made to its proprietors, $2,974,659 69, a sum exceeding the ascertained cost of the correspondent portion of the canal, on the Potomac, now nearly completed, provided a due allowance be made for the difference in their plans and construction.

As a plan of navigation for the entire valley of the Potomac has been frequently recommended to the Chesapeake and Ohio Canal Company, and was once proposed for the James river, by a late engineer in the service of the Board of Public Works of Virginia, the committee beg leave, for a few moments, to call the particular attention of the House to one relative aspect of the comparison which they have instituted, between the profits of the Schuylkill navigation and of the Chesapeake and Ohio canal. It is, that the latter is to be a continuous canal, and the other consists, in part, of a series of pools, sustained by dams, and connected by locks.

There are many small streams, subject to very little alluvial deposite, like the Antietam branch of the Potomac, and some considerable rivers, of gentle current, very high banks, and comparatively narrow breadth, like the Great Kenhawa, which may be judiciously improved by dams, forming artificial basins and locks, either within those dams, or in short canals, passing around them, from one level to another. Even where such a mode of improvement would be attended with great cost, a cost even greater than that of a continuous canal, still it should be preferred, if the preservation of a uniform system of navigation, throughout an extensive commercial channel, render it necessary to avoid frequent transhipments. But for some distance, as along the great falls of the Potomac, a system of dams and locks was impracticable, as it would be, through the far greater part of the mountain sections of this canal, for various reasons. Uniformity, therefore, instead of being promoted, must have been sacrificed, and, it is believed, economy also, had such a system been adopted for the Potomac valley. Steam is not yet used as the propelling force on any canal in the world. And if mere animal power be regarded, as it every where continues to be, the moving spring of canal navigation, very serious objections arise to the intermingling of canals with broad, deep, and extensive pools of slack water, having a towpath along their margin, for the trackage of the canal boat. The broader and deeper the river to be so improved, the more injudicious will be such a combination. To a certain degree, such a combination of canals with wide pools, would deprive any line of inland navigation of the peculiar advantages of each. It surrenders the certainty and safety of the continuous canal, without the indemnity of a cheaper propelling power, applicable to boats of enlarged dimensions.

The last report of the managers of the Liverpool and Manchester railroad, of which, an extract will be found in the appendix to this report, ascribes the increase of the tonnage of that road, for the last half year, to the frequent storms and high winds which obstructed the descent of the Mersey and Irwell, and the Bridgewater canal boats to Liverpool, along the broad expanse of the Mersey, below Runcorn.

It is a notorious fact, that the river boats of the Potomac had sometimes to lie by, for days together, at various harbors above, as well as immediately below the old tide locks near Georgetown, on account of high winds; which frequently prevent the ordinary traveller from crossing, at the ferries of this river, very far above its principal falls.

The President and Directors of the Schuylkill Navigation Company, comprise in their last annual report, among the causes which rendered the liberal grant of $300,000, for certain improvements in their navigation, "insufficient, the *delays* and *losses* incident to unusually frequent *freshets* on the *river*, and heavier damages allowed to individuals than were expected."

The objections to the system of lock and dam navigation, which was considered and rejected in all the examinations and estimates which preceded the commencement of this canal, and which has been so long exploded and abandoned in Europe, but yet lingers, it would seem, in America, are great, manifold, and obvious; especially where the towpath, along a broad river, liable to frequent and heavy freshets, supplies the place of an independent and continuous canal.

They may be comprised under the four following heads: 1st. The diminution of the propelling power of the boat, arising from its more indirect application. This necessarily results from the elevation of the towpath many feet above the ordinary surface of the river, to avoid its frequent inundation, and the increase of the horizontal distance of the boat from the line of traction, or towpath; an objection which can be overcome in the lowest state of the water of the pools, only at much previous expense of excavation under water. Upon a *well constructed* canal, even, this loss is equivalent to a deduction of twelve or fifteen per cent. from its tracking power. 2dly. The occasional suspension of the navigation of the pools, by freshets, at all seasons, and by floating ice, trees, and brush, in winter and spring, involving in great hazard the cargo of the boat, and the safety of the persons on board. 3dly. The very obvious and serious augmentation of the labor of preserving the boat channel unimpeded by alluvial deposites of trees, brushwood, earth, sand, and gravel. And, lastly, the absolute although most uncertain dependence of an entire line of improved navigation, however extended, on the constant preservation or instant renewal or repair, often impracticable, of every dam of the very many which its use requires.

Apart from the absolute impossibility of passing the Great falls of Potomac, by dams and locks, the ascent of 578 feet in a distance of 188 miles, could not have been effected, without the erection of twenty-nine dams, each of very near twenty feet elevation, allowing nothing whatever for the depth of navigable water required at their base, to enable the boat to reach the next pond. These dams would have varied, in length, from between 2,560 and 500 feet; and the failure of any one of them, through defective construction, accidental injury, or decay, to keep up the necessary depth of water in every pool, would have totally arrested the entire navigation between

Washington and Cumberland, till such dam should be repaired or reconstructed. Should such a failure have occurred in the winter or spring, requiring a whole summer and autumn for a remedy, it would have involved the loss of a year's income, not to the company alone, but to the whole country dependent, on this uncertain mode of navigation, for access to market.

The actual canal, on the other hand, will have but eight of these structures, three of which are less than six feet in height, and are exposed, by their plan, to no damage that a few weeks' labor might not suffice to repair. The actual destruction of no one of them all, except that at the head of the line of navigation, which they all merely feed with water, need suspend the navigation of the canal altogether; though the loss of several, at the same moment, would render it difficult and inconvenient to keep up, at all times, an adequate supply of water. The number of dams upon the Schuylkill is unknown to the committee, but, if indicated by the number of guard locks, as is probable, it embraces no less than twenty-eight.

The Schuylkill navigation, as has been remarked, unlike the Potomac, receives no considerable tributary river, but it resembles the eastern section of the Chesapeake and Ohio canal in a very important particular, common to both, their connexion with the Ohio. The first sixty-one miles, reaching to within three of Reading, is part of a chain of inland navigation connecting, by means of a portage railroad of thirty-six miles across the Alleghany the State canal of Pennsylvania and the Union canal between the Susquehannah and the Schuylkill, the tide of the Atlantic with the town of Pittsburg. This extensive connexion, very recently completed, is, in length, 438¾ miles, of which the "Schuylkill navigation" supplies sixty-one miles, the Union canal eighty-two, and the State canals and portage, between them, 295¾ miles. Its total lockage is 1752 feet.*

In this distance, which exceeds the proposed connexion between the tide of the Potomac and the same point on the Ohio by very near one hundred miles, besides the interruption of a portage over land, there are three lines of navigation, formed on distinct and independent plans; the smallest of which, the Union canal, in consequence of the very reduced dimensions of its locks, will admit of the passage of no boat exceeding in burden from twenty to thirty tons.

The width of this canal, at the surface, is but thirty-six feet, and its depth of water but four feet; its locks are seventy-five, by eight and a half feet, in the chamber. Those of the Schuylkill, it has been seen, comprehend two several dimensions, each of which varies from the locks of the State canals, of the Susquehannah, Juniata, Conemaugh, Kiskiminitas, and Alleghany rivers, which are all parts of the same line. In order to reach the Susquehannah, by this line of navigation, in addition to thirty-two locks on the Schuylkill, a rise and fall of five hundred and twenty feet, distributed among ninety-one locks, must be passed on the Union canal. To reach the portage a further lockage of 398 feet must be encountered, and to pass it, a rise and fall of 2,570 feet in 36 miles of railway.

Although the superiority of water, over any known species of land carriage, for heavy and bulky commodities, be so far established by experience, as to secure to the Union canal, small as are its dimensions, the

* This lockage is less by 1,406 feet, than that of the Chesapeake and Ohio canal; an advantage much more than counterbalanced by the continuity and enlarged dimensions of the latter.

transportation from the Susquehannah to Philadelphia of all the heaviest products of the vast country drained by the navigable waters of that river, yet they will manifestly reach their destination, at a price augmented by an expense of carriage beyond the corresponding charge upon those from the head waters of the Potomac. (Vid. App. R.)

For the supply of bituminous coal to the markets of the Atlantic, as well as of lumber and iron, the Chesapeake and Ohio canal will, therefore, possess a decided advantage over this line of improved navigation, highly valuable as it now is, and will probably continue to be. (See App. S.)

Before closing this comparison of the relative advantages of the Chesapeake and Ohio canal, and of the two most profitable works in the United States, the Erie canal and the Schuylkill navigation, the abundant, though cheap produce, which the former will draw from the estuary of all its waters, the fisheries of the Potomac, below tide water, should not be omitted.

At numerous fishing shores, some of which rent as high as $3,000, several thousand laborers are employed, every season, in supplying this wholesome and nutritious food, to an extent, which has reached, in a single spring, many thousand tons. Extensive as is the present market for this food, many millions of herrings, of which 1,300,000 have been caught at one haul, are thrown away or spread over the fields, as manure, for want of a sufficient demand for their immediate consumption, or of labor to cure them; a waste, which will never occur, after the Chesapeake and Ohio canal shall have opened a western market, or penetrated, by its eastern section, to the base of the Alleghany. Fish, which so moderately enlarges the tonnage of the Schuylkill navigation, will then largely contribute to the revenue of the southern canal. (Vid. App. T.)

Compared with other channels of supply for coal, whether bituminous or anthracite, as with that of the "Lehigh navigation," composed, as the Schuylkill, of canals and pools of slack water for forty-five miles, and connected with the tide of the Delaware above Bristol, by a canal from Easton, 59¾ miles long, forty feet only at the surface, and five feet deep; or, with the more northern communication of the Hudson, from a point a hundred miles above the city of New York, with the Lackawannock mines of Pennsylvania, by means of a railroad of sixteen miles, overcoming, by five stationary steam engines and two self-acting planes, a rise and fall of fifteen hundred feet, leading to a canal of thirty-two feet breadth, encumbered by one hundred and ten locks, since the discovery of anthracite coal in the vicinity of the Potomac, within one hundred and thirty miles of tide water, no doubt can be rationally entertained that the Chesapeake and Ohio canal will share with those northern channels of trade, in the supply of this species of coal, not only to the extensive country intersected by it and its tributary rivers, but to the whole seaboard of the United States.

Its successful competition with other works in this very important trade, will be ascribable to those enlarged dimensions which give to its propelling power superior efficacy, and to its boats increased capacity, as well as to the uniformity of its extended navigation, in which it so greatly surpasses the system of the Pennsylvania canals.

In the supply of bituminous coal, it has not a rival north of the Potomac, that of the west branch of the Susquehannah being 264 miles from Philadelphia by water, or, should the Columbia route be preferred, 224 miles by a canal and railroad. (Vide App. O.)

In closing this protracted comparison, the committee disclaim any intention whatever of depreciating other channels of useful intercourse, all of which are indebted, for their origin, to the same liberal and enlightened spirit which animated the various Legislatures which have given their countenance and aid to the Chesapeake and Ohio canal. It would be a subject of merited reproach, if this work, following, in order of time, the great canals of New York and Pennsylvania, had not improved in some degree, upon their example, in its plan, construction, and cost.

Among the sources of revenue comprised in the receipts of the Schuylkill Navigation Company, the rent of surplus water has, in a few years, risen, as has been stated, to 16,673 dollars.

The charter of the Potomac Company expressly authorized, and seemed indeed, to require, such a construction of their various canals, as to fit them for the double purpose of navigation and manufactures. The charter of the Chesapeake and Ohio Canal Company, on the contrary, from an apprehension that this authority might be abused, by creating a current in the canal prejudicial to its navigation, has expressly limited such use of its redundant water, to the local position of its necessary wastes.

Experience, however, having satisfactorily demonstrated that on a canal of very enlarged dimensions, and fed by a considerable river, a large water power may be conveniently created, and judiciously applied to manufacturing purposes, especially in the vicinity of its dams, and along the levels of its feeders from them, the Legislature of Virginia readily acceded to the petition of the present Canal Company, for permission to dispose of its surplus water, without any other restraint on the power to do so, except that it shall be exercised without detriment to the navigation of the canal. Pennsylvania had, with her characteristic sagacity, in relation to the improvement of all her sources of national wealth, conferred this power, unsought, by her act of incorporation of 1826; and Maryland has recently concurred in the views of both her sister States, with certain modifications, arising from local, and, it may be presumed, as well as hoped, from transient considerations.

It only remains, at present, for the United States, the fourth party to the charter, to assent to an amendment, alike beneficial to the canal and the public, in order to place the surplus water of the Potomac, which the former company were authorized and advised to apply to manufacturing purposes, at the disposal of their successors. Instead of proving injurious to the navigation the dams which the company may hereafter multiply across the river, will, by deepening the water upon its natural bed, extend the benefits of the canal to boats from the opposite shore of Virginia, while they will, also, eminently contribute to the general health of the adjacent country, by covering those numerous shoals and stagnant pools which, in the heat of an autumnal sun, send forth their unwholesome effluvia. (Vid App. U.)

Commanding a fall of 578 feet, in the Potomac, the company will possess not only a source of revenue calculated, in aid of further subscriptions to their stock, to extend their canal, but to attract and fix permanently on its banks, the labor, capital, and skill, necessary to develop, and fit for the use and convenience of a great and increasing population, the inexhaustible mineral treasures that lie buried in the bosom of the adjacent country.

In the view which the committee are authorized to take of the Chesapeake and Ohio canal, as the shortest channel of inland navigation, be-

tween the Atlantic and the Ohio, that revenue, also, should be here included, which may be confidently anticipated from the transportation of persons, as well as property.

Since the introduction of light, but commodious packet boats, moving with the celerity of ten and twelve miles an hour, upon the English, as well as the Scotch canals, a doubt can no longer exist, but that this capacious canal may become a channel of personal and social, as well as commercial intercourse.

On the Ardrossan canal, which connects the manufacturing town of Paisley, with the great western seaport of Scotland, there passed, during the first six months of the last year, packet boats, drawn each by two horses, which made eighteen trips a day, to and from Glasgow, carrying an average of five and forty passengers, at the speed of ten miles an hour, and the moderate cost of a penny a mile for each person. During the months of July and August last, the number of passengers exceeded a thousand a day; and if this cheap intercourse could be readily sustained by night, as well as by day, without a single accident, on one of the narrowest canals of Great Britain, how much more easily, and securely from all danger, may it be accomplished, on that which, when completed, will be the largest canal in the world. A canal, the guard banks of which are every where wide enough to supply a second towpath, and the coal on the banks of which may, at no distant day, afford a substitute, in steam, for the frequent relays of horses which this rapid motion requires, so as yet further to cheapen the cost, and quicken the speed of this agreeable mode of travelling. (Vid. App. V.) And if the Chesapeake and Ohio canal shall hereafter become the chief thoroughfare, as it well may, of persons, as well as property, between the Atlantic and Western States, the seat of whose common Government it unites with the valleys of the Ohio and the Mississippi, the Gulf of Mexico and the great Northern lakes, its importance will be as inappreciable, in its moral and political influence, as its revenue will be unbounded, except by the express limitation of its charter.

It remains for the Government of the Union, whose early and liberal co-operation gave vitality to this noble enterprise—a Government which had, and yet retains, by far, the deepest interest in its success—to say, whether it shall stop, at the point at which it has now arrived, or proceed one step further towards the accomplishment of this, its leading purpose.

From the preceding narrative of the rise and progress of the Chesapeake and Ohio canal, it will be readily believed, that neither the State of Maryland, nor the town of Alexandria, whose original subscriptions, amounting to three-fourths of a million, were expressly dependent on that of one million of dollars by the United States; nor the other subscribers, corporate as well as individual, would have begun, or, had they even begun, would have given their sanction to the enlarged dimensions of this canal, without any indemnity to them for its additional cost, in an augmented rate of tolls, had they not, one and all, confidently believed, that if Congress co-operated, at all, in its construction, it would not, provided it were properly conducted, be permitted to fail, for want of adequate funds for its completion.

The report of the engineers of the United States, in 1826; the revision of their estimates by the civil engineers deputed by the Executive to re-examine the foundations of that report; the recommendations of two Presidents in succession, and of several committees of the House of Representatives; the subscription of a million to commence the enterprise, by so

large a majority of both Houses of Congress, while they denoted a preference of the most enlarged plan for this work, furnish conclusive evidence that neither House, nor any friend of the measure, supposed that this subscription would supersede all further application for pecuniary aid, since the total capital of the company, at this period, obviously falls short of the estimated cost of the smallest and cheapest dimensions and plans for this work, that were at any time submitted to the public.

The facts which are now presented to the House most clearly manifest, that the eastern section has not yet reached the extent at which it was believed, and stated that the canal would become productive of profit to its stockholders; and might supply, by its own credit and resources, a part, at least, of the necessary funds for its completion.

It has been shown that its plan and construction are in accordance with the principles of science, and the views of that board of engineers, at whose head, was then placed, a distinguished foreigner, acquainted with all the public works of Europe, and charged with preparing a plan for the common defence of the United States; that its mode of execution has been twice inspected and approved, by officers of rank and experience, selected and deputed, by the Executive, from the same scientific corps, who, with every facility afforded them for the discharge of their duty, could have had no motive to slight or neglect its performance: that its cost has fallen far below the prior estimate of this corps, and it may, and should be added, that every dollar of it, to an amount largely exceeding three millions, had been faithfully accounted for, at the date of the last annual report of the President and Directors. (Vid. App. W.)

As the 109 miles of the eastern section, about to be completed, will consume its subscribed capital, without further pecuniary aid from Congress, it must be promptly arrested in its course.

The consequent dispersion of its engineers and contractors, in whose ability, integrity, and industry, long experience has taught the company to confide, will prostrate the hopes of its friends, and greatly augment the future cost of its construction; for it cannot be seriously apprehended that any disaster will lead to the utter abandonment of an enterprise of such local, as well as national importance, so deliberately begun, and, as far as it has advanced, so steadily, and, it may be added, so faithfully and successfully prosecuted. A work which dates the general sense of its expediency from the middle of the last century; and the first efficient step to its commencement, from the issue of that revolution, of which, it may be truly considered, in the language of a great statesman, as one of the "earliest fruits;" a work, to which the great champion of that revolution, the beloved and revered father of his country, devoted the leisure of his repose from war; which a President of the United States, his companion in arms, distinguished for the prudence and circumspection of his whole administration, most zealously recommended to the favor of Congress; and to the propitious commencement of which his immediate successor, along with the labor of his hands, contributed the unqualified approval and energetic support of his powerful and well-stored intellect. (Vid. App. R.)

The Congress and people of the United States viewing, in this monument of their patriotism, a result of their present, and an imperishable bond of their future union; having cherished it, when it held out but the promise of success, and the hope of public benefit, will not, the committee persuade themselves, refuse to it their necessary aid, when it has but just overcome

the numerous obstacles to its progress, both moral and physical; after it has prevailed on an incorporated company, which pre-occupied its ground, to surrender their charter, and on the Legislatures of three States and of the Union, to co-operate in giving to it a corporate existence; after it has induced two of those Legislatures, in providing funds for its commencement, to combine the public revenue with that of three rival towns who had never, before, been known to act in unison with each other.

The interests which it tried, in vain, to conciliate, sustained by justice, it has encountered and defeated. It has finally triumphed over all its enemies. It has done even more than this. It has, by its firmness, patience, and moderation, converted its most active and formidable enemies, into as active and efficient friends. It has now, in truth, no enemies, and confidently looks for support to the source of its being—the Congress of the United States. It is not, at such a moment, that the Legislature of the Union will abandon the work, which has grown up, and, so far, prospered beneath their own eye, and which urgently appeals, for the means of its future growth, to their consistent wisdom and patriotism.

That this appeal assumes no new ground, but is, in all respects, conformable to the views presented to Congress, prior to the commencement of this enterprise, will be apparent, from a recurrence to those reports, on which, its zealous friends rested the success of the subscription by Congress, in 1828.

This committee beg leave, on the present occasion, to close their report in the language of their predecessors.

"The Committee on Roads and Canals," on the 30th of January, 1827, recommended a subscription of two and a half millions to the stock of this canal. Their entire report, which is embodied in that of their immediate successors, of the 2d of January, 1828, limiting that subscription to a million, says that "the committee now come to the last object of the memorialists, which is to procure a subscription to the stock of the Chesapeake and Ohio canal, of such amount, and on such terms, as they deem *essential to the commencement*, and calculated to *assure* the speedy accomplishment of their enterprise.

"The memorialists ask a subscription to the stock of the canal to the indefinite extent of a moiety of the sum which may be found necessary to its completion, or of a specific sum, supposed to be a moiety of that required for its extension from Georgetown to the mouth of Savage, or to the extensive coal banks at the base of the Alleghany.

"The committee have preferred the last form, and have accordingly recommended a subscription of twenty-five thousand shares of stock, to be paid for in not less than five annual instalments; so as to limit the annual payment by the United States to half a million of dollars, and the total sum subscribed to two and a half millions; and they have deferred any further subscription on the part of the Government, till the eastern section of the proposed canal be completed.

"Superadded to the conditions already noticed, the bill which the committee have framed requires, in order to give validity to any subscription whatever by the United States, that a sum, not less in amount than the above, shall be subscribed by other stockholders, whose good faith it secures by a practicable and adequate guaranty.

"As one of the motives of the subscription provided by the bill is to give to this great work dimensions adapted to future and permanent national

use, among the prescribed conditions of that subscription, the committee avail themselves of the scientific research of the United States engineers, to provide not only for an adherence to the transverse section recommended for the entire canal by their report; but to include a further provision for so enlarging the canal, as to reduce, wherever it is possible, without great additional expense, the resistance of the boat, for which the locks of the canal are calculated, to that, which such boat would have to encounter in the navigation of an indefinite expanse of water.

"The difference of the resistance which this boat would meet on a canal having a breadth of forty feet only at the surface, twenty-eight feet at the bottom, with a depth of four feet, compared with that which the same boat would have to overcome on a canal of the breadth and depth of that recommended by the United States engineers, demonstrates, irresistibly, the expediency of adopting the last dimensions, where practicable, for the entire canal; and an extension of the same principle warrants the proposed enlargement, where it can be effected, by "ordinary excavation," by which is understood to be meant that of common earth.

"Having required of the company, as a condition of the United States subscription, a structure of the Chesapeake and Ohio canal, which must considerably augment its cost, and which is designed to make it subserve purposes of great and lasting public utility, rather than of immediate profit, the committee felt themselves authorized, if not bound, to couple with the United States subscription, a concession, thus rendered as just, as it is expedient, since it might eventually prove indispensable to the prompt success of this great undertaking, that the Government of the United States shall forbear to exact any share of the common profit upon the stock which it subscribes, until all other subscribers shall have netted a reasonable return, or five per centum per annum, for the sums of money that they may have severally paid on account of their respective subscriptions.

"The subscription of stock in behalf of the United States, in very large proportions to the total amount required for the construction of very short canals, of easy execution, already commenced, or far advanced towards completion, having been already sanctioned by very large majorities of both Houses of Congress, the committee do not deem it necessary, here, to enlarge upon the power of Congress to authorize any such subscription. That, to the stock of the Delaware and Chesapeake canal, amounted to $300,000. The subscription to the Dismal Swamp canal, grounded on the condition of its enlargement, and requiring no correspondent aid from other subscribers, exceeded its original capital. That, to the Louisville canal, while in progress, bore a larger proportion to its antecedent stock.

"Two of these canals, it may be, moreover, remarked, are but expedient substitutes for a navigation before enjoyed along the Atlantic seaboard, circuitous, indeed, but at all times practicable, and safe in peace from any danger but of the sea; and the third, at the falls of the Ohio, for a navigation open at high water, to the descent of the largest ships; and impeded, in its worst condition, by a portage of but two miles, along the level bank of a river, through a flourishing town, affording every accommodation to the navigator, in the midst of very short delays."

The subscription, which the committee recommend, is to a work yet to be begun, but which, if successful, and of that no rational doubt exists, provided adequate funds for its execution be supplied, will supersede a navigation not only obstructed, but at all times dangerous, and a portage of many miles

over rugged and lofty mountains, separating a population of two millions from the residue of the same people, who are destined to multiply with a rapidity unexampled, but among themselves, on both sides of the great barrier to their friendly intercourse, which this canal is designed to surmount.

"The committee did not unanimously concur in recommending this subscription, without duly considering every other mode of accomplishing a work as essential, in peace, to the permanent union and commercial prosperity of the Eastern and Western States, as in war, to their common defence and safety.

"They were, moreover, aware, that its accomplishment, by the direct agency of the Federal Government, without the intervention or co-operation of a joint stock association, had been deemed, by respectable authorities, preferable to the mode devised by the charter of the Chesapeake and Ohio Canal Company. In this preference, however, all the difficulties in practice have been overlooked or disregarded, arising from the condition and claims of the existing Potomac Company, under their charter; from the express denial of the power of the General Government to construct a canal, by one of the parties to that charter; and from the contrariety of opinion, on this interesting topic, existing in both Houses of Congress, among those who, admitting the authority of the common Government, derive it from very different sources in the constitution, and disagree in opinion as to the legitimate mode of its operation.

"A larger number of those friends of internal improvement, it is believed, will be found to unite in this, than in any other practical use of this much contested federal power.

"The committee also believe, that expediency will recommend the mode of executing this great work, in which the Government of the United States has concurred, by the act of the 3d of March, 1825, and is now urged to co-operate by a subscription of stock.

"This expediency is fortified by the long continued experience of that European nation which, above all others, is most distinguished in every branch of political economy, and is, moreover, sanctioned by the authority and reason of the father of that science, if science it may be called, the distinguished author of the Wealth of Nations.

"All the canals of Great Britain, with but two exceptions, have sprung from the wealth and efficiency of joint stock companies.

"To incorporate private with public wealth, individual interest with public responsibility, in the execution and preservation of a work requiring vigilance to enforce a just economy in its construction, and circumspection to watch over its repairs, is alike the dictate of reason and experience.

"But if it were more expedient for the Government of the United States to construct and maintain, at its exclusive cost, works of national utility, it cannot be less prudent to enlarge the beneficial operation of the resources which it devotes to such purposes, by eliciting a moiety, at least, of that cost, from those private capitalists, who can be induced, but by the hope of gain, to quicken the diligence and watch over the integrity of the subordinate agents, commissioned to disburse the common funds, for the common welfare.

"The committee are sustained, on the ground of these suggestions, by the consideration that they have been long fostered by the legislation of one State, at least, of this Union; that they were originally incorporated

in its system of internal improvement, with this difference only, that, while the subscriptions of the funds of this State are limited to two-fifths only, or less than a moiety of the stock required for a canal or artificial road, promising great public benefit, it forbears any claim whatever to a share of the common dividend or profit of stock in any such work, till all other subscribers to the same stock shall have netted *six* per cent. per annum on their respective pecuniary contributions.

"It is the obvious tendency of such a system, to economize the disbursements of the public revenue when applied to internal improvement, and to extend the efficiency of a given expenditure, by combining it with that private capital which could not be otherwise elicited for the common benefit of the United States.

"If, in union with these principles, the public appropriations to canals and roads be renewed, from time to time, by the sale and reinvestment of the subscribed stock, whenever it shall have replaced the interest of the sums paid for it, and have reached a par value in market, a moderate annuity, devoted exclusively to internal improvement, may have its beneficent agency so widely extended over the United States, as to be competent to every reasonable demand for objects purely national.

"By transferring to the agency of an incorporated company, the construction and maintenance of each public work, so executed, that extension of the patronage and influence of the Federal Government, which is apprehended, from the application of the national revenue to works of internal improvement, will also be in a great degree precluded.

"A sum may be laid up, in peace, in an imperishable form, by the completion of works essential to the public prosperity and safety, which the assignable quality of the public stocks invested in their construction would afford to the Government a facility for applying to the first exigencies of future wars.

"The internal trade, which, in periods of national danger, or obstructed foreign intercourse, supplants, in whole or in part, the usual importations from abroad, will enhance the value of this resource, when most needed to aid the declining revenue of a Government, resting, almost exclusively, upon foreign imports, for the means of defraying all its most necessary operations.

"Against the possible objection that war might be wantonly waged, if, by anticipation, resources were provided to meet its first pressure, without a resort to direct taxation, the countervailing consideration arises, that, during its disastrous continuance, it would turn to its unprofitable and wasteful purposes, the means of extending those internal improvements which can hope for their accomplishment only from the leisure and abundance of peace. It is in peace, also, that the additional duties received on those multiplied returns from abroad, for the varied exports with which internal navigation supplies external commerce, would afford an immediate pecuniary recompense to the Government, for its liberal aid in the construction of canals, of national importance, leading into the interior.

"If the committee shall seem to have dwelt too long on considerations not peculiarly associated with the particular object of their present inquiry, their apology will be found, they trust, in the important bearing which these considerations must have on the question, whether, in the present stage of the great national work, which they presume thus earnestly to recommend to the favorable regard of the House, it be expedient

to extend towards it the pecuniary aid which the memorialists have invited.

"The committee cannot regard the subscription, proposed by the bill which they report, as disproportionate to the relative interest of the Government of the United States in the construction of the Chesapeake and Ohio canal, on the plan recommended by the Board of Internal Improvement. As a proprietor, interested in a work to which his subscription is invited; as the exclusive guardian of the District of Columbia; and as the Federal Legislature of twenty-four States, the Congress of the Union may well invite the public co-operation in a work of unrivalled local, as well as national utility.

"Among the proprietors, who look to its execution for an appreciation of the value of their landed property, the General Government is incomparably the largest. The value of this proprietary interest is to be computed in reference, not only to the extensive property of the United States, consisting originally of a moiety, and still of a great portion of the city of Washington, but to that vast unappropriated domain beyond the Alleghany, which still looks to emigration to people and improve it, and from the sale of which an annual revenue of two millions of dollars is now anticipated.*

"By greatly cheapening the intercourse between the East and the West, the heavy expenditure which the emigrant now incurs, in a protracted journey over numerous mountains, will be converted into an additional fund for the purchase of public lands, and their value enhanced, by affording to the purchaser a new facility for reaching without hazard, both in peace and war, the improved markets of the Atlantic, with the diversified productions of his labor and industry.

"In regarding the actual condition of a part of those markets, a second interest is developed, accompanied by a high political obligation; that of the exclusive sovereign of a district of country, narrow, indeed, in dimensions, but embracing all the cities of the Potomac, and the district of country to which the proposed canal is to be immediately conducted. If it would be the interest of those cities, had they the pecuniary ability, to construct such a canal, at their exclusive cost, the Government which has confided to it the power of legislating for their benefit, cannot be insensible of the high obligation to promote that interest, which the acceptance of so solemn a trust necessarily implies. Not only the prosperity, but the future safety, of the people of this District puts up an urgent claim to the exercise of a sovereign authority entrusted to the Central Government of the United States, not for their benefit alone, but for the permanent advantage, security, and honor, of the entire Union. The District of Columbia is not bound to the Union as a State, but as the immediate subject of the Government of all the States. It is, in truth, the property of the whole Union; and whatever advances its prosperity, is of immediate importance to the general welfare of that Union. The exclusive legislation of Congress over the District of Columbia, combines both Federal and State authority; is a complete sovereignty, one and indivisible. Having such a power over the territory and people of the District, for the benefit of the Union, the Congress are invoked to its beneficent exercise, not only by all

* The United States now own 3,200 building lots in Washington, besides several hundred acres of public grounds, which, if this canal succeed, will be of immense value.

those considerations to which a State may appeal, in addressing its local Legislature, but by all those federal obligations to the States themselves, which are involved in the exclusive legislation of the General Government over the seat of its deliberations, and the political centre of its operations.

"If the Legislature of a single State might legitimately labor to attract to the bosom of its territory the vast and increasing commerce of the West, so may the Congress of the United States to the District of Columbia; and so they are, therefore, bound to do, if it be practicable. The extent of this obligation in relation to the construction of that channel which the Chesapeake and Ohio canal provides for accomplishing this object, is not to be measured, as has been sometimes suggested, by the relative proportion which the length of so much of this canal as will lie within the territory of the District, bears to its whole line, since such a ratio is not an adequate standard of the relative benefits to be derived from its completion, to the various portions of territory through which it must pass. Were this otherwise, the extensive States and remote Territories on the immediate banks of the Ohio and the Mississippi, or intersected by their numerous tributaries, would have their immeasurable interest in the execution of this great work expressed by the very small proportion which the single point that it proposes to touch at Pittsburg, bears to the whole line of continuous navigation which the canal will establish across the Alleghany, between the Atlantic and the numerous rivers of the West.

"The interest of a great market in that channel of trade, which draws to it the various productions of the industry of a vast empire, is to be measured by the entire profits of that trade; and, if the profits of the commerce of the West, or any considerable share of them, be assumed to be the measure of the interest of the District of Columbia, in the proposed canal, and to promote that interest be a duty of its exclusive Legislature, the subscription of a moiety of the stock of the canal is not more than commensurate with the obligations of the Federal Government to the people confided by the constitution to its provident care.

"Can this obligation be evaded, by limiting the extent of the United States subscription to this canal, by that portion of the public revenue derived from the people of the District of Columbia?

"That they are unrepresented, would furnish a fair ground of implication that they should be untaxed, under a Government owing its existence to the principle that taxation, without representation, is tyranny. But the people of the District are subject to the same species of taxation with all the citizens of the United States, under a system of revenue, which, founded on the consumption of foreign imports, precludes the application of any exact estimate of the amount of their contribution to the common Treasury. If greater precision were attainable, the committee are totally at a loss to conceive how it could warrant a conclusion at variance with that at which they have arrived.

In founding a durable work, its remote as well as proximate benefits are to be regarded; and what scale of measurement can determine the future extent of the population, wealth, and consequent consumption of the District of Columbia, if it shall become, as its great founder confidently anticipated, the emporium of the West?

The end of the delegation to the Federal Government of any power whatever over the District of Columbia, was simple, indivisible, and of

universal interest.* For the promotion of this end, the common Government may rightfully, and must, necessarily, command the common revenue of the Union. Whatever augments the wealth and population of the District, adds to the security of the seat of the Federal Government of all the States. The prosperity of the District and of the Union cannot, therefore, be severed. A neglect to promote, by all practicable and ordinary legal means, the welfare of a people who have no Government but that of the United States, would not be less dishonorable, than to decline the exercise of an acknowledged federal power, when manifestly required for the benefit of the American people. The power over this District, vested in Congress by the constitution, is, therefore, accompanied by obligations of high dignity, that can be surrendered, neglected, or abandoned, only by a dereliction of duty, little short of a violation of the letter, as well as of the spirit of the constitution itself.

"The memorialists appeal, moreover, to the relation of the Federal Government to the States, which it unites, in behalf of a work calculated to perpetuate to the American people, and their latest posterity, the blessings of peace, freedom, and independence: objects which, in themselves, can have no limit to their value; because, without them, all other advantages, public or private, national or individual, are precarious and fleeting. The expediency of providing for objects of such magnitude, can be bounded only by the extent of the public resources. And no provision, among the many internal improvements which solicit the favorable countenance and pecuniary aid of the Federal Government, can surpass, in this tendency, the Chesapeake and Ohio canal. Extended, as was originally contemplated by the memorialists, and is now found practicable, from the Chesapeake to Erie, by Pittsburg, it unites, by one unbroken line of navigation, the shortest that can be devised, the seat of the Government with the three great limits of the United States: the Atlantic Ocean, the Gulf of Mexico, and the great Northern lakes.

"No State of this Union; not one of its many markets; no branch of its industry, whether it speed the plough or spread the sail, or ply, at home, the shuttle or the hammer; whether its activity be exerted on land or sea, to the North or South, the East or West; is without an interest in the accomplishment of this national work.

"The committee deem it unnecessary further to enlarge upon a topic,

* Act of cession by the State of Virginia distinctly sets forth this end.

"SEC. 1. Whereas the equal and common benefits resulting from the administration of the General Government will be best diffused, and its operations become more prompt and certain, by establishing such a situation for the seat of the said Government, as will be most central and convenient to the citizens of the United States at large, having regard as well to population, extent of territory, and a free navigation to the Atlantic Ocean, through the Chesapeake bay, as to the most direct and ready communication with our fellow-citizens on the Western frontier: *And whereas* it appears to this Assembly, that a situation combining all the considerations and advantages before recited, may be had on the banks of the river Potomac, above tide water, in a country rich and fertile in soil, healthy and salubrious in climate, and abounding in all the necessaries and conveniences of life, where, in a location of ten miles square, if the wisdom of Congress shall so direct, the States of Pennsylvania, Maryland, and Virginia, may participate in such location:

"*Be it therefore enacted by the General Assembly*, That a tract of country, not exceeding ten miles square, or any lesser quantity, to be located within the limits of this State, and in any part thereof, as Congress may by law direct, shall be, and the same is hereby, forever ceded and relinquished to the Congress and Government of the United States, in full and absolute right, and exclusive jurisdiction, as well as of soil, as of persons residing, or to reside thereon, pursuant to the tenor and effect of the eighth section of the first article of the constitution of the Government of the United States."

which, if it claim the exercise of a constitutional authority, more questionable than either of those powers on which this report has hitherto relied to warrant the appropriation that it recommends, rests that claim, on the strongest ground, that can be presented to the General Government—in behalf of a canal, connecting the seat of its deliberations, and the source of its political action, with the remotest extremes of its wide spread territory. A work which, in the number of interests which it has sought to harmonize, as well as in the complicated political agency which the charter to construct it required, illustrates, alike, the extent of its utility and the difficulty of its accomplishment, without the authority and aid of a common Government. Having been brought, by great preparatory labor, to its present condition, it awaits, for its future progress, the acquisition of adequate funds to commence its operations. And, for these, it relies, as must every similar undertaking, on the wisdom, enterprise, and resources of all the interests, national and local, public and individual, involved in its successful prosecution.

"Should the Government of the United States, however, regard as insufficient to warrant the aid which the committee have proposed, to the House of Representatives, to extend to this work, all those considerations arising from its relation to the national domain, to the prosperity of the District of Columbia, and to the welfare and safety of the Union, still there remains another ground, on which, to rest the expediency of the proposed subscription. For, although, according to the terms annexed to it in the bill reported by the committee, the profit to be derived from the canal, by the United States, is made contingent, and dependent on the prior profit, to a limited extent, of all other subscribers to the stock of the canal; yet the general views which have been presented, and those which a closer investigation will superadd, must induce a confident belief that the public Treasury, should its claim to profit be deferred for a time, will be ultimately reimbursed all that it is invited to advance, with ample interest.

"The committee, indeed, very confidently believe that, on the single article of coal, an estimate might be founded, sufficient, of itself, to assure a liberal profit on the entire cost of the eastern section of the Chesapeake and Ohio canal.

"The most profitable canals in England, are those that serve to distribute for consumption, this valuable fuel, which enters, as a necessary of life, into the price of all human labor, and constitutes the *primum mobile* of so many arts.

"In no part of that kingdom, however, nor in any region of the United States, east of the Alleghany, can it be drawn from its native beds at so little cost, as at the head of the Potomac navigation, where it is elevated in parallel strata, nearly horizontal, above the surface of the proposed canal, and will be adjacent to its banks, or form a part of them. Less than one cent a bushel, or twenty-eight cents the ton, will be required to load the boats, which transport it; four cents will pay for its transportation, in boats adapted to the canal, from the coal banks to tide water; and allowing five cents for the canal toll on each bushel, it can be sold, in the markets of the District, with a mercantile profit of twenty-five per cent., at twelve and a half cents the bushel, or very little more than one-third of its present cost, in domestic use.

"When, added to the other almost innumerable uses of this commodity, that application of it be regarded, which the same region of country

favors, (abounding, as it does, both in limestone and iron ore,) to the smelting and manufacture of iron, in all its branches, it is difficult to place any limits, but those which the charter of the Chesapeake and Ohio Canal Company annexes, to the future profits of its stock; and no doubt can exist but that the use of this canal, must always exceed in extent that of the canal, which connects the Hudson with Lake Erie.

"There can be no rivalship, however, between two canals, which, in whatever manner improved, will, at a period not remote, be totally inadequate to waft the boundless supplies, with which, the agriculture and the arts, the internal and foreign trade of an immense empire, will crowd their surface.

"The committee believe that the time is not far distant, when, if every drop of water that can be commanded for the supply of continuous canals across the elevated summits which divide the Eastern and Western waters, shall be brought into use, the whole quantity will not suffice to waft between them, the exchangeable surplus productions of the labor, enterprise, and capital, of the extensive territories on their borders.

"All local interests should learn from this suggestion, if founded in truth, that they have no cause for jealousy, and much for concord, in the great work of internal improvement, of which the Chesapeake and Ohio canal constitutes but a single, though an essential feature."

"They believe that the completion of the proposed canal, by augmenting the exports, and consequently the imports, of the United States, would bring in to the public Treasury an annual return, exceeding greatly the interest on the sum which the Government is invited to subscribe. That return will, also, increase in proportion as the canal is extended, or the payment of the annual instalments of this subscription proceeds. This will not be deemed too sanguine an estimate, when it is reflected that the freights, and commission, and insurance, as well as all other charges of exportation, are paid by the value of those imports which are chargeable, by the customs, with an average duty of not less than twenty-five per cent. If, therefore, an addition be made, by the proposed canal, to the amount of those exports, of but one-fifth in value of the sum subscribed by the United States, the duties on the correspondent imports from abroad, will annually return to the public Treasury more than five per cent. on the total sum subscribed. Such subscription, therefore, will accelerate, rather than retard, the payment of the public debt.

"Sums of money judiciously invested in canals, if they at first yield little profit, are, in truth, but loans, the principal of which is inviolably secure, and their rate of interest certain of speedy and constant augmentation. In the estimate of their probable returns, the commerce which they create, must be added to that which they merely facilitate.

"Subscriptions to the structure of canals may be founded on loans, therefore, without affording to posterity cause to complain; since their benefit descends unimpaired with the debt which they contract, the cheap price of the countless blessings which they diffuse."

MEMORIAL

Of the Chesapeake and Ohio Canal Company to the Congress of the United States—December 12, 1833.

Pursuant to a resolution of the stockholders of the Chesapeake and Ohio Canal Company, hereto attached, marked A, the President and Directors of said company beg leave respectfully to represent:

That this valuable and important undertaking is now in successful operation from the city of Washington to Harper's Ferry, in Virginia, and its advantages are speedily beginning to be felt and known to the inhabitants who reside along the line of its projection. A fertile and valuable region of country abounding in bread stuffs, and mineral and forest resources,is fast opening to commercial pursuit, and new avenues to industry and enterprise are unfolding themselves. Valuable materials, which for ages past have lain dormant on our shores and mountains, because of the forbidding expense of reaching a profitable market through this opened channel, must soon form an increased source of wealth, whereby to enrich its citizens, and to advance the general interests of the country.

Contracts have been entered into, and are in rapid progress towards completion, to a point beyond Williamsport, in Maryland, which are expected to be finished during the ensuing spring and summer, whereby a line of canal communication will be completed for more than one hundred miles west of the city of Washington.

Your memorialists are aware of the differences of opinion which exist in reference to the subject of internal improvement; they take leave, however, to say that, in the whole undertakings and plans, present and in prospect, none probably ought to be considered of higher national importance than the Chesapeake and Ohio canal: its importance may well entitle it to be considered a national work. Its tendency is to subdue obstacles which nature has interposed, and, in interest and feeling, to unite those who in these respects are strangers to each other; thus to draw in closer ties the bonds of our Union.

Such may be the result of completing this canal to the Western waters; but, if this be an anticipation too flattering to be entertained, it is not unreasonable to say that the advantages in prospect should stimulate the parties interested to press forward its completion to the base of the Alleghany mountains, that the country may have the benefit of the many valuable materials which, even there, may be found. Timber useful to our navy and to other important purposes; valuable cements; all kinds of bread stuffs; iron ore and inexhaustible beds of coal, lie on the range and course of this canal. If the Government of the United States shall never receive any dividend from their funds invested in this enterprise, their gain will nevertheless be great in the cheapness of living which will be afforded to the citizens of their capital, and the increased strength which it must necessarily afford to the Union. Preserve this, we should, at any sacrifice; and surely that is preferable which shall tend to bring us to a knowledge of the wants and necessities of each other, in virtue of those principles which the constitution of the country recognises.

It is not for us to argue and urge the necessity and importance of constructing and finishing this projected work; that is a subject which belongs to those whose right it is to inquire, and who are abundantly competent to decide. A large amount of public and private capital has already been expended in this enterprise, most of which must be lost if it now fail.

Entire success can only be expected from the liberality of Congress, Virginia, and Maryland, who are in interest, and the desire they may entertain to further a work which, fairly considered, promises to be of great public utility. Individual enterprise is incompetent to so great an undertaking, and yet there are persons who, to promote it, have in a spirit of liberality already embarked their fortunes beyond half a million of dollars. From the depreciated state of the stock, arising from a distrust of its final completion, any further private subscription is not to be expected.

The question for consideration is, shall the canal progress, or be arrested? The aid which Congress may afford, will at once answer the question. It is believed to be a work without the scope of the President's objections as to the subject of internal improvement, and one which Washington, the father of his country, was known fondly to cherish. It is important in a commercial point of view, and, being completed, cannot fail more strongly to unite the eastern and western sections of our country, and thus strengthen the Union. Whether a work thus defended and sustained by the highest considerations which should influence patriots and statesmen shall progress, is for Congress and the Executive to determine. The submission is made with entire confidence to their discretion and judgment.

It has been said, and often repeated, that this republic was becoming too mighty, and that ultimately it must sink and be destroyed by its own pressure. It may turn out to be true, but if true, to no cause will it be more ascribable than to a want of proper facilities to a free and friendly intercourse with each other, whereby the people of these States may be rendered one in feeling, and identical in interest. They should be so rendered, for let them become disunited in the great concerns which interest creates, and those ties which now connect and bind may be lost and destroyed. The social compact would never have been entered into, if it had not become necessary that the weak should be protected from that power which ever belongs to the strong. Make the parts of a community dependent on each, and affection and kind feeling will be the sure and inevitable result; disregard it, and schisms, and strife, and difficulties must and will arise to disturb our quiet, and interrupt our repose.

In 1828 the canal was commenced with a fund adequate to all the purposes of a beginning, but, in the opinion of none, sufficient for the completion of so great an undertaking as the connecting of the Eastern and Western waters. No one could have been so weak in thought or in calculation as to believe that without a liberal support from the Government the scheme could ever be effected. It was of immediate concern to some of the States of this Union; Virginia, Pennsylvania, and Maryland were directly, and the whole of the Western States eventually, interested. This city, the metropolis of the Union, is also materially and directly concerned, and upon its success her resources and credit have been risked. In the same adventure the corporations of Alexandria and Georgetown, and the citizens of the District, have liberally embarked their means and placed their hopes.

The stock subscribed was 38,584 shares of one hundred dollars each, distributed as follows:

	Shares.	
United States - - -	10,000 -	$1,000,000
State of Virginia - - -	2,500 -	250,000
State of Maryland - -	5,000 -	500,000
Corporation of Washington -	10,000 -	1,000,000
Corporation of Alexandria -	2,500 -	250,000
Corporation of Georgetown -	2,500 -	250,000
Private subscription - -	6,084 -	608,400
	38,584	$3,858,400

To which add tolls received, and which have been applied to the construction of the canal - - -	93,552
Making the entire funds to be - - - -	$3,951,952
Of which amount there was expended up to the 1st of the present month of December, 1833, - - -	3,333,952
Leaving on hand, applicable to contracts not finished, a balance of - - - - - -	618,000
From which, deducting on account of supposed insolvencies of individual stockholders, - - - -	100,000

and there will remain at the disposal of the company for the further progress of the work about half a million of dollars. Of this, two hundred and eighteen thousand are in six per cent. Washington city and Georgetown stocks, redeemable next July, and which, owing to the present pressure in the money market, are not at this time available to the company at par value. For the same reason, payments from individuals cannot be enforced, without occasioning much embarrassment and distress to subscribers. These facts are stated to show the necessity of early action on the part of the Government, if it be their pleasure that the work shall further progress.

In pursuance of another resolution, marked B, your memorialists beg leave further to represent that a portion of the stock subscribed remains unpaid; some of those who became subscribers have removed themselves from this section of the country, others are unable to pay, and to attempt to coerce them would only occasion litigation and expense to the company. In many instances but a single dollar has been paid on the subscription. It is proposed, therefore, that the President and Directors have authority granted to them, on giving three months' previous notice in some newspaper, to declare every subscription forfeited to the company where $50 have not been paid on each share.

All of which is submitted for consideration.

By order of the stockholders and Directors of the Chesapeake and Ohio Canal Company:

JOHN H. EATON,
President Ches. and Ohio Canal Co.

December 13, 1833.

Resolutions of the stockholders of the Chesapeake and Ohio Canal Company, referred to under reference

A.

"*Resolved*, That the President and Directors of the Chesapeake and Ohio Canal Company be, and they are hereby, instructed to make application to the Congress of the United States, and to the Legislatures of the States of Maryland and Virginia, for additional subscriptions to the capital stock of said company, and that they memorialize the Legislature of Pennsylvania to co-operate with them."

J. P. VAN NESS,
Chairman of said meeting.

B.

"*Resolved*, That the President and Directors of the Chesapeake and Ohio Canal Company be authorized to ask for any alteration of the charter that they may deem necessary, the President and three directors being present and concurring therein."

J. P. VAN NESS,
Chairman of said meeting.

At a meeting of the President and Directors of the Chesapeake and Ohio Canal Company, held on the 13th day of December, 1833, at which meeting there were present John H. Eaton, President, and William Gunton, Phineas Janney, and Walter Smith, it was unanimously

Resolved, That the amendment to the charter of the company, as proposed by the preceding memorial to the Congress of the United States, is deemed necessary.

Attest :

JOHN P. INGLE,
Clerk of the Ches. and Ohio Canal Co.

Accompanying this memorial is a report from Captain William G. McNeill, of the United States engineer corps, made by order of the Secretary of War, and at the request of the Secretary of the Treasury. It exhibits fully, and in detail, the state, condition, and progress of the canal, and is, accordingly, presented for the inspection of Congress.

J. H. EATON.
President Ches. and Ohio Canal Co.

MEMORIAL

Of the President and Directors of the Baltimore and Ohio Railroad Company, in favor of a further subscription of stock to the Chesapeake and Ohio canal.

FEBRUARY 10, 1834.

To the honorable the Senate and House of Representatives of the Congress of the United States:

The memorial of the undersigned respectfully represents:

That your memorialists have watched with the deepest interest the commencement and progress of the Chesapeake and Ohio canal, as a great national enterprise, originating with the father of his country, and displaying more clearly as it advances, the enlightened sagacity and foresighted patriotism of its illustrious projector.

The claims of this noble work to the countenance and patronage of the General Government, have been so often urged, and your honorable bodies already possess, in so many authentic forms, the fullest and most detailed evidence of its practicability and advantages, that the undersigned will not venture to repeat the arguments, or to spread anew before you the facts, which carried conviction to the minds of your predecessors, and the force of which time has only served to strengthen and confirm. But they would respectfully point to the present auspicious era, as offering a new impulse, and supplying an additional motive to the further and vigorous interposition of Congress.

The national debt is discharged. That cherished object—of deep and absorbing interest to the whole country, not only in reference to a just feeling of security and independence, but to the character and practical working of our republican institutions—has been accomplished. We are rid of the accumulated charges of two costly wars witnessed by the same generation. We transmit no burden to posterity to clog its rich inheritance; and, surely, at this moment of complete disengagement from pecuniary solicitude, when the great object of inquiry is as to the least mischievous plan for employing a redundant revenue, we do not err in asking you to give back to the nation, in the shape of a diffusive blessing, a portion of what has been confided to your disposal.

The objection, urged with success, to solicitations in reference to improvements of a local, limited range and usefulness, will not be pretended to be applicable here. There is nothing in this enterprise of a narrow, sectional character; in it mingle freely the sympathies and interests, as do the waters of the East and the West. Nor will it fail to occur to your honorable bodies, that the question is not an open one, of original investment, but that a large amount of money, under an appropriation by Congress, has already passed into the work, and must share its fate. Shall the past expenditure be lost to the country? There is nothing, as the undersigned conceive, in the history of the work, which can justify such infirmity of purpose, and rash abandonment of a great public stake.

Your memorialists would respectfully venture to suggest that the cha-

racter of the principal fund, which now flows into the Treasury with embarrassing profusion, may be considered as pointing to the proposed method of application. It is obvious that the impost at the custom-house ultimately presses with more severity on the consumer, who is furthest removed from the seaboard. The various agents of traffic, intermediate to consumption, take care to remunerate themselves liberally in the price of the article for every change to which it is subjected in its passage through their hands. There would seem, then, to be no more equitable arrangement than that the tax, which grows at each stage of transit, and carries its accumulated claim to reimbursement into the remotest cabin of the West, should be employed in alleviating the burden, by bringing the two great sections of our country together into close commercial contact.

The commonwealth of Pennsylvania, as well as Virginia, Maryland, and the United States, has taken an early, decided, and magnanimous part on this subject. Her own resources and credit are deeply pledged in the construction of works to which the one in question might, if viewed with narrow jealousy, be deemed a rival. She has not yet hesitated to raise her voice, and to exercise her influence in furthering a great national object. Her statute book presents the following resolution:

"*Resolved by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met*, That the Senators of this State in the United States Senate, and the Representatives of this State in Congress, are requested to endeavor to procure the passage of a law authorizing the subscription of a million of dollars, on the part of the General Government, to the stock of the Chesapeake and Ohio Canal Company, to be expended on the western section."

The undersigned respectfully ask that this appeal may now be listened to, when our financial condition no longer requires that the urgent claims of a just, wise, and comprehensive national spirit should be slighted or postponed; and they are further encouraged to hope that it may be successful, from the consideration that this is an object eminently "*national*, and *partly completed*," and of course not affected by the objections urged against *new* and *local* objects; besides, it is not an original but a further investment of funds, to save and render productive four millions of dollars already expended, one-fourth thereof belonging to the United States, which without this further aid must be lost to the country, with all the rich fruits, the benefits and blessings of this great national enterprise, destined not only to facilitate and cheapen the commercial and social intercourse between the Atlantic and Western States, but bind them together in a bond of perpetual union, thereby consummating the last and favorite object of Washington, the father of his country.

P. E. THOMAS.
SAML. SPRIGG.
R. B. MAGRUDER.
ALEXANDER FRIDGE.
ALEXANDER BROWN.
WM. STEUART.
JOHN McKIM, Jr.
J. LUCAS, Jr.
J. SWAN.
EVAN T. ELLICOTT.
AMOS A. WILLIAMS.
H. W. EVANS.
WM. PATTERSON.
JNO. J. DONALDSON.
ROBERT OLIVER.
GEO. HOFFMAN.

G. BROWN,
Treas. B. and O. R. R. C.

BY THE HOUSE OF DELEGATES.

March 11, 1834.

Whereas the Legislature and people of Maryland feel a deep interest in, and anxiously desire the early completion of the Chesapeake and Ohio canal; and whereas the immense advantages in trade and commerce to result from the completion of that work to the whole people of the West, as well as the middle portion of the Atlantic seaboard, to say nothing of the inestimable value, as the strongest ligament and firm bond of our Union, give to it, emphatically, a national character, and claim for it the liberal patronage of the General Government: Therefore,

Resolved by the General Assembly of Maryland, That the Senators of this State in the Congress of the United States be instructed, and the Representatives requested, to use their best exertions to obtain from Congress, at its present session, such a liberal appropriation of the public funds in aid of the further construction of the Chesapeake and Ohio canal, as shall ensure its completion.

Resolved, That the Governor be, and he is hereby, requested to cause a copy of these resolutions to be transmitted forthwith to each of our Senators and Representatives in the Congress of the United States.

We certify that the aforegoing is a true copy of the original resolution, passed by both branches of the Legislature at December session, 1833.

Given under our hands this 13th day of March, 1834.

LOUIS GASSAWAY,
Clerk House of Delegates, Maryland.
JOS. H. NICHOLSON,
Clerk Senate, Maryland.

ERRATUM.

Page 30, line 10 from top, for "$3,760,000," read $3,600,000.

RESOLUTIONS

OF

THE LEGISLATURE OF MARYLAND,

To obtain an Appropriation in further aid of the construction of the Chesapeake and Ohio Canal.

March 29, 1834.

Referred to the Committee on Roads and Canals, and ordered to be printed.

Executive Department,
Annapolis, March 14, 1834.

Sir: I have the pleasure to transmit to you the annexed preamble and resolutions which have been adopted and passed by the General Assembly of Maryland.

With the highest consideration and respect,
Your obedient servant,
JAMES THOMAS.

Honorable Joseph Kent, *U. S. Senate.*

By the House of Delegates, *March* 11, 1834.

Whereas the legislature and people of Maryland feel a deep interest in, and anxiously desire, the early completion of the Chesapeake and Ohio Canal; and whereas, the immense advantages in trade and commerce, to result from the completion of that work, to the whole people of the west, as well as the middle portion of the Atlantic Seaboard, to say nothing of the inestimable value as the strongest ligament and firm bond of our Union, give to it emphatically a national character, and claim for it the liberal patronage of the General Government:

Therefore, resolved, by the General Assembly of Maryland, That the Senators of this State, in the Congress of the United States, be instructed, and the Representatives requested, to use their best exertions to obtain from Congress, at its present session, such a liberal appropriation of the public funds, in aid of the further construction of the Chesapeake and Ohio Canal, as shall insure its completion.

Resolved, That the Governor be, and he is hereby, requested to cause a copy of these resolutions to be transmitted forthwith to each of our Senators and Representatives in Congress of the United States.

We certify that the foregoing is a true copy of the original resolutions, passed by both branches of the Legislature, at December session, 1833. Given under our hands this 13th day of March, 1834.

LOUIS GASSAWAY, *Cl'k Ho. Del. Md.*
JOS. H. NICHOLSON, *Cl'k Senate, Md.*

RAILROAD COMPANY, BALTIMORE & OHIO—SUBSCRIBE FOR CHESAPEAKE AND OHIO CANAL STOCK.

MEMORIAL

OF THE

President and Directors of the Baltimore and Ohio Railroad Company, in favor of a further subscription of stock to the Chesapeake and Ohio canal.

February 10, 1834.

Referred to the Committee on Roads and Canals.

To the honorable the Senate and House of Representatives of the Congress of the United States:

The memorial of the undersigned respectfully represents:

That your memorialists have watched with the deepest interest the commencement and progress of the Chesapeake and Ohio canal, as a great national enterprise, originating with the Father of his country, and displaying more clearly as it advances, the enlightened sagacity and foresighted patriotism of its illustrious projector.

The claims of this noble work to the countenance and patronage of the General Government, have been so often urged, and your honorable bodies already possess, in so many authentic forms, the fullest and most detailed evidence of its practicability and advantages, that the undersigned will not venture to repeat the arguments, or to spread anew before you the facts, which carried conviction to the minds of your predecessors, and the force of which time has only served to strengthen and confirm. But they would respectfully point to the present auspicious era, as offering a new impulse, and supplying an additional motive to the further and vigorous interposition of Congress.

The national debt is discharged. That cherished object—of deep and absorbing interest to the whole country, not only in reference to a just feeling of security and independence, but to the character and practical working of our republican institutions—has been accomplished. We are rid of the accumulated charges of two costly wars witnessed by the same generation. We transmit no burden to posterity to clog its rich inheritance; and, surely, at this moment of complete disengagement from pecuniary solicitude, when the great object of inquiry is as to the

least mischievous plan for employing a redundant revenue, we do not err in asking you to give back to the nation, in the shape of a diffusive blessing, a portion of what has been confided to your disposal.

The objection, urged with success, to solicitations in reference to improvements of a local, limited range and usefulness, will not be pretended to be applicable here. There is nothing in this enterprise of a narrow, sectional character; in it mingle freely the sympathies and interests, as do the waters of the East and the West. Nor will it fail to occur to your honorable bodies, that the question is not an open one, of original investment, but that a large amount of money, under an appropriation by Congress, has already passed into the work, and must share its fate. Shall the past expenditure be lost to the country? There is nothing, as the undersigned conceive, in the history of the work which can justify such infirmity of purpose, and rash abandonment of a great public stake.

Your memorialists would respectfully venture to suggest that the character of the principal fund, which now flows into the Treasury with embarrassing profusion, may be considered as pointing to the proposed method of application. It is obvious that the impost at the custom-house ultimately presses with more severity on the consumer, who is furthest removed from the seaboard. The various agents of traffic, intermediate to consumption, take care to remunerate themselves liberally in the price of the article for every change to which it is subjected in its passage through their hands. There would seem, then, to be no more equitable arrangement than that the tax, which grows at each stage of transit, and carries its accumulated claim to reimbursement into the remotest cabin of the West, should be employed in alleviating the burden, by bringing the two great sections of our country together into close commercial contact.

The commonwealth of Pennsylvania, as well as Virginia, Maryland, and the United States, has taken an early, decided, and magnanimous part on this subject. Her own resources and credit are deeply pledged in the construction of works to which the one in question might, if viewed with narrow jealousy, be deemed a rival. She has not yet hesitated to raise her voice, and to exercise her influence in furthering a great national object. Her statute book presents the following resolution:

"*Resolved by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met*, That the Senators of this State in the United States Senate, and the Representatives of this State in Congress, are requested to endeavor to procure the passage of a law authorizing the subscription of a million of dollars, on the part of the General Government, to the stock of the Chesapeake and Ohio Canal Company, to be expended on the western section."

The undersigned respectfully ask that this appeal may now be listened to, when our financial condition no longer requires that the urgent claims of a just, wise, and comprehensive national spirit should be slighted or postponed; and they are further encouraged to hope that it may be successful, from the consideration that this is an object eminently "*national*, and *partly completed*," and of course not affected by the objections urged against *new* and *local* objects; besides, it is not an original but a further investment of funds, to save and render productive four

millions of dollars already expended, one-fourth thereof belonging to the United States, which without this further aid must be lost to the country, with all the rich fruits, the benefits and blessings of this great national enterprise, destined not only to facilitate and cheapen the commercial and social intercourse between the Atlantic and Western States, but bind them together in a bond of perpetual union, thereby consummating the last and favorite object of Washington, the Father of his country.

P. E. THOMAS.
SAML. SPRIGG.
R. B. MAGRUDER.
ALEXANDER FRIDGE.
ALEXANDER BROWN.
WM. STEUART.
JOHN McKIM, Jr.
J. LUCAS, Jr.
J. SWAN.
EVAN T. ELLICOTT.
AMOS A. WILLIAMS.
H. W. EVANS.
WM. PATTERSON.
JNO. J. DONALDSON.
ROBERT OLIVER.
GEO. HOFFMAN.
G. BROWN,
Treas. B. and O. R. R. C.

PENNSYLVANIA.

MEMORIAL

Of citizens of Pennsylvania, praying for an appropriation to construct a canal from Chesapeake Bay to Lake Ontario.

December 11, 1833.

Referred to the Committee on Roads and Canals.

To the honorable the Senate and House of Representatives of the Congress of the United States:

The petition of the subscribers, citizens of Pennsylvania,

Respectfully represents:

That the various internal improvements which have been constructed, and which are in the course of execution, in many sections of our country, have naturally directed the attention of the public to this important means of improving the condition of the citizens of this Union. The canals and railroads, and improvements by slack water, which have already been constructed, have in most instances conferred important benefits upon the community, within the sphere of their influence. The advantages resulting from them have excited a desire in many of our fellow-citizens, that a portion of the funds of the *General Government* should be applied to similar objects. The extinguishment of the public debt will soon leave a large amount of money at the disposal of Congress. It cannot be desirable that the immense revenue of the Government shall remain in the Treasury, but rather that it should be expended, as it arises, in a manner most conducive to the public good.

Believing that the interest of the public generally requires the application of a portion of this revenue to internal improvements, we submit to the consideration of Congress two projects, which we consider to be deeply interesting to a large portion of the Union, and eminently entitled to be considered as *national improvements*. These improvements are the construction of a steamboat navigation between the seaboard and the lakes, from the Chesapeake bay, up the Susquehannah river, and through the Seneca lake and Oswego river, to Lake Ontario; and a similar connexion between Michigan lake and the Illinois river. The construction of these improvements would effect a circle of inland steamboat navigation of several thousand miles in extent. They would be highly beneficial to many of the States, and of immense *national* importance. The completion of the Rideau canal and slack water navigation, extending about two hun-

dred and seventy miles, from Kingston to Montreal, a communication navigable for steamboats and sloops, and of the Welland canal around the falls of Niagara, have not only diverted from our own seaboard the productions of our own territory, but have peculiarly exposed our Northern frontier, in the event of a war with Great Britain. Through these improvements, that power will have the means of concentrating a large naval force upon the lakes. Some counteracting improvement should be executed, which will enable our own Government to meet the enemy in the event of a war, and which will also retain the trade of our Western States. The expense of erecting a sufficient number of vessels necessary in the emergency of war upon the lakes, will be very considerable; and they will be of little use in a state of peace. The Susquehannah river affords the means of effecting such a communication, at an expense by no means considerable, when compared with the immense resources of the General Government. Of the practicability of the improvement of the Susquehannah for steamboat navigation, no question exists. The explorations of engineers, under the authority of Pennsylvania and Maryland, establish such practicability at a moderate expense, when considered in reference to the magnitude of the improvement. The Susquehannah affords a sufficiency of water as far north as the New York line; the distance thence to tide water is about three hundred miles. The fall in this distance is between seven and eight hundred feet; about two hundred of which are between tide water and the head of the Conewango falls, a distance of about fifty-seven miles. The Welland canal overcomes a rise of about three hundred and sixty feet in thirty-eight miles. If a slack water navigation cannot be made at a reasonable expense along the whole distance between the Conewango falls and tide, of which, however, little doubt exists, a steamboat canal can readily be made at such points as may be necessary. No obstacles to improvement by slack water exist between the Conewango falls and the New York line. The Seneca lake and the Oswego river afford the means of communication with Lake Ontario; or, if it be considered important that the improvement should be effected entirely within our own territory, a steamboat canal may probably be constructed direct from Geneva to Buffalo, or the Erie canal enlarged, to answer the purpose. And as to the *western* improvement, but little difficulty exists; the summit level between Michigan lake and the Illinois river, being but twelve and a half feet high, presents but an inconsiderable obstacle to the execution of that part of the project.

The extent of country interested in these two improvements, embraces probably more than half of the Union. No other improvements within our country can be projected, which will be so extensively useful. As a bond of union between the East and the West, the North and the South, they will be of the utmost importance. The extensive internal trade which will float upon them, will tend to bind together the remote sections of our country by the tie of common interest. In time of war they will afford the opportunity of concentrating the national force *wherever required.* They will ameliorate, and in a great degree tend to equalize the condition of the people in the different sections of our country, by affording to all the means of a cheap and speedy conveyance to market, and for receiving, in return, the various productions of our own and of foreign lands. The commerce of our Western States will have a passage to market entirely within the territory of their sister States; and the productions of the great

West will be secured to our Atlantic cities, instead of passing into the dominions of our rival. The extensive deposites of anthracite coal, which have as yet been discovered only within the limits of Pennsylvania, and which exist in immense quantities along the Susquehannah, render the *eastern* improvement of great importance to at least one-half of the States of the Union. This advantage cannot be obtained by effecting the connexion between the ocean and the lakes through the North river. That river, moreover, is not so *central to the Union* as the Susquehannah, and the point of connexion with the St. Lawrence would be greatly exposed to the enemy. The Rideau and Welland canals, constructed by our Canadian neighbors, are about three hundred miles in length. The State of Pennsylvania alone has expended upon her improvements money, in all probability, sufficient to execute the improvements now projected. To the General Government our citizens confidently look for the improvement of the great channels of intercourse, the cost of which is too considerable for the means of the States individually, or which are important to several States, or to the nation generally. Deeming the improvements now petitioned for as works of a *national* character, we pray for their execution with the funds of *the nation*, and ask that Congress will immediately make an appropriation for the purpose, or have such surveys and estimates made as will enable your honorable bodies to act definitively in relation to them at the next session.

And we will ever pray, &c.

23d Congress, 1st Session. [Doc. No. 38.] Ho. of Reps. War Dept.

CHESAPEAKE AND OHIO CANAL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

The information required by a resolution of the House of Representatives of 24th ultimo, in relation to the Chesapeake and Ohio Canal.

JANUARY 14, 1834.

Referred to the Committee on Roads and Canals.

WAR DEPARTMENT,

January 13, 1834.

SIR: In obedience to the directions contained in the resolution of the House of Representatives, passed the 24th ultimo, calling for the reports of Cols. Abert and Kearney, and Capt. McNeill, respecting the Chesapeake and Ohio canal, I have the honor to transmit, herewith, a report from the officer in charge of the Topographical Bureau, accompanied by a copy of Capt. McNeill's report, and containing a reference to the public documents, where the others may be found.

Very respectfully,
Your obedient servant,
LEW. CASS.

Hon. ANDREW STEVENSON,
Speaker of the House of Representatives.

TOPOGRAPHICAL BUREAU, *Jan* 13, 1834.

SIR: I have the honor to transmit, herewith, a copy of the report of Capt. Wm. G. McNeill on the Chesapeake and Ohio canal, in compliance with a resolution of the House of Representatives of the 24th ultimo, requesting "that the Secretary of War be directed to communicate to this House the report of Cols. Abert and Kearney; and, also, the recent report of Capt. William Gibbs McNeill, of the corps of Topographical Engineers, on the plan, construction, costs, and actual condition of the Chesapeake and Ohio canal," and referred to this bureau, and beg leave

to refer you to so much of the resolution as relates to the report of Cols. Abert and Kearney, to State papers, Vol. 1, Doc. No. 18, 1st session 22d Congress. Respectfully submitted.

GEO. D. RAMSAY,
Lt. in charge of T. B.

Hon. Lewis Cass, *Secretary of War.*

REPORT

Of Capt. Wm. G. McNeill on the condition of the Chesapeake and Ohio canal.

Boston, Mass., *Dec.* 1, 1833.

To Lieut. Col. J. J. Abert,
Topographical Bureau, War Dept., Washington City:

Sir: In compliance with the orders of the Hon. Secretary of War, communicated to me through the Topographical Bureau, under date of May 16, 1833, as soon after as practicable, I repaired to Washington City, and having, as directed, reported myself to the Secretary of the Treasury, on the 1st of June I received from that officer his instructions to "proceed and make the necessary examination" of the Ohio and Chesapeake canal, which, from an enclosed transcript of the resolution passed by the Board of Directors of that company on the 4th of May, I was apprised included an extent of "sixty-four miles, which were expected to be completed and brought into active use in the course of the month;" as well as "thirty-eight miles in addition thereto," which were then also "under contract."

As a preliminary to this examination, I accordingly at once conferred with Gen. Mercer, the presiding officer of the company, then in Washington, not only that I might become fully possessed of the nature and extent of the inspection contemplated by the resolution of the directors, but that in its execution I might avail myself of those facilities which were promptly afforded, in his instructions to the several resident engineers, to disclose fully all information which could be desired, either by a personal co-operation with me in the field, or by a full exposition of the archives of the company, to which my attention was specially invited.

Under these advantageous circumstances, I proceeded on the 4th of June to the fulfilment of the duty which had been assigned me, traversing the line of canal throughout the extent to which it had either been completed, or was in the progress of construction; the result of my observations during which tour I shall now have the honor to communicate. I would premise, however, that they correspond so nearly in all essential particulars with the numerous detailed statements which, from time to time, have been officially announced through the printed reports which have been submitted to the stockholders, that the main object in view will, perhaps, as well have been attained by my corroboration of those statements, as by the repetition of facts which, on reference to those reports, will, for the most part, be found to have already been disclosed.

Nevertheless, the magnitude of this great work may permit an examination of details (at the hazard of being tedious) which will perhaps be

found illustrative of its extent and character; while the importance of the enterprise, in the widely diffused benefits which must attend its success to an extended portion of our country, encourages the hope that, even in pursuing the beaten track which laid before me, additional information may have been gathered by the way-side, the dissemination of which will, at least, prove useful.

I shall proceed, therefore, now to state the character and condition of such portion of the canal, with its various appendages, as had either been completed, or had been placed under contract; which, computing from the basin in Georgetown, (where my examinations began,) ascends the valley of the Potomac river upwards of 107 miles, or to the guard lock succeeding dam No. 5, above the town of Williamsport.

Of this portion every part of the work may be said to have been entirely completed to the "*Point of Rocks*," 48 miles from the basin at Georgetown, and, with very unimportant exceptions, (where the discovery of slight imperfections has already led to their repair,) exhibited all that faithfulness of execution which ensures stability.

The reports of Cols. Abert and Kearney, who preceded me in a similar examination in 1831, so minutely described this section of the canal, that a very general summary will suffice to exhibit the facts which I would bring in review on this occasion.

In the words of the late president of the company, (see 3d annual report, page 13,) it may emphatically be remarked, that "on no canal in America, and very few, if any, in the world, will there be found, and certainly on no part of the Ohio and Chesapeake canal do there remain to be encountered, obstacles more appalling than have been overcome." True it is that he refers more especially to that particular section which embraces the descent between the Great and Little Falls of the Potomac; "a compass of eleven miles along precipices bounding a river which has borne on its bosom ice and snow elevated for several miles 30 feet above its ordinary height." Yet the numerous locks and culverts, the extent of rock excavation, and of outer walling which has been found necessary to the support and protection of the towpath, two expensive aqueducts, &c. &c., constitute difficulties characterizing the whole section under consideration, which, from description alone, can scarcely be appreciated. But they were encountered boldly and judiciously, and, in the successful issue which has attended the persevering efforts of those to whom this great work has been entrusted, it is to be hoped that encouragement may not be wanting to enable them to reap the full fruition which must attend the final completion of the enterprise.

To surmount the elevation of 217 feet, (the level of the canal at the Point of Rocks above the basin in Georgetown,) 27 locks, generally of 8 feet lift, have been constructed, the total cost of which has been (as per statement furnished me by Mr. Fisk, an assistant engineer in the service of the company, to whom, as also to Messrs. Cruger and Purcell, the resident engineers, I am indebted for a mass of valuable facts) $265,142, being an average of $1,221 85 per foot lift, inclusive of the cost of foundations, and of gates, and, in part, the excavation of the lock pits, as well as the embankment around the locks.

These locks being nearly all of them, as before remarked, of 8 feet lift, the above average of $1,221 85, (deducting for excavation and embankment,) is equivalent to $1,136 per foot lift; or, as there are about 1,084

perches in a lock of 8 feet lift, it is equivalent to $7 per perch for the masonry, and 1,500 for the foundation and gates. The subjoined table (A) will exhibit the locality of the several locks, the lift of each, the description of materials of which they were constructed, and the locality whence these materials were procured, which, with all the details of their plan, as enumerated in the report of Colonels Abert and Kearney, have permitted such an analysis as enables me to say that, under all the circumstances, a due economy has, in my opinion, obtained, both as it respects the prices paid, and the character of the work. The general dimensions of the locks are 15 feet in width in the chambers, and 100 feet between the upper sides of the mitre sills, and, with one exception, from No. 1 to No. 25, inclusive, they are filled through culverts in the side walls. (See report of Colonels A. and K., p. 16.) Locks Nos. 26 and 27 are filled through culverts in the side walls, and through a paddle in each of the upper gates—the upper being nearly of the same length as the lower gates. As the dimensions of the locks are uniform, and all information respecting their character and locality will have been furnished by table (A.) it may here be added that, from lock No. 28, inclusive, upwards, the culverts in the side walls (which mode of construction is liable to some objections) are dispensed with, and four paddle valves in the upper gates, (which are one foot shorter than the lower gates,) 2 feet by 2½ feet, are substituted. (See specifications.) It is not apprehended, however, in the present case, that from either mode there will result insecurity to the works, or inconvenience in the operation of filling the locks. Of the character and condition of the culverts, if, in all instances, I am not able to bear as favorable testimony, it results from exceptions too unimportant to be worthy of any other comment than that they consisted in imperfections which were soon discovered, and easily remedied, and which doubtless, ere this, have ceased to exist; and from the precautions which were taken (as stated in the report of Colonels A. and K., p. 22) to secure their foundations, as well as from the ample dimensions of all parts of these useful and important appendages to the canal, there is ample assurance of their stability.

In all, including road-ways, there are fifty-nine culverts below the Point of Rocks, the cost of which has been (agreeably to the statements furnished me) $110,000, of which number the 32 culverts on the first 22 miles contiguous to and below the Point of Rocks, (which, being in general unfinished, were not so particularly attended to at the date of the last inspection,) have cost $59,000. Of this sum, the masonry, amounting to 11,357 perches, cost $50,000, or an average of $4 40 per perch; $9,000 being the cost of the foundations, of puddling the culverts in part, and for the excavation of the pits.

The dimensions of these 32 culverts are as follows:

1 of 2 feet span; 11 of 4 feet span; 9 of 6 feet span; 2 of 8 feet span; 1 of 9 feet span; 1 of 10 feet span; 3 of 12 feet span; 2 of 16 feet span; 1 of 2 arches of 16 feet span each; 1 of 20 feet span over the Little Monocacy.

The masonry of one of the above culverts, (that of 2 arches of 16 feet span each,) containing 1,100 perches, cost $5,807; the stone for which were boated 8 miles, and hauled nearly half a mile; that of another of 20 feet span, over the Little Monocacy, with an oblique arch, $5,354—the number of perches in it being 1,241, and the stone obtained within half a mile. The culvert over the Tuscarora, 2 miles above the Monocacy

aqueduct, of 16 feet span, containing 919 perches, cost, for the masonry, $3,676, the stone being brought from Virginia within 1½ miles. The other culvert, with an arch of 16 feet span, one mile below the Point of Rocks, (where the materials for its construction were obtained,) cost, for its 764 perches of masonry, $2,528 50. The stone for all the others, 22 in number, (deducting 6, the materials of which were transported about half a mile,) was obtained by water from distances varying from 2 to 8 miles; this difference in transportation causing the price of masonry (which averages, as above stated, $4 40 per perch) to range between $3 50 and $5 50 per perch.

The hydraulic cement used in the construction of all the culverts cost the contractor at the rate of $1 per perch.

The remaining culverts of the 59, mentioned as being the total number below the Point of Rocks, and situated on the first 26 miles of the canal, from Georgetown upwards, are spoken of generally in the report of Colonels A. and K.; they are 27 in number, and cost $51,000; the average price per perch being rather less than those above, on account of the greater facility of obtaining stone.

Next, in the enumeration of the items of expense, which have contributed materially to enhance the cost of the section of canal under consideration, are the Seneca and Monocacy aqueducts, the details of the plans of which will be found in the report before alluded to, (pages 17, 20,) although, at that time, comparatively little progress had been made in their construction. They have since been entirely completed, and now constitute enduring monuments of the skill and fidelity with which they have been executed.

Aqueduct No. 1, across the Seneca river, built of the red sand stone of Seneca, (procured within half a mile of its site,) is 114 feet in length between its abutments, which, with its two piers, rest on a solid rock foundation. It consists of 3 arches of 33 feet span each, and cost $22,784.

Aqueduct No. 2, over the Monocacy river, built of a white granite stone, of excellent quality, obtained from quarries within 3 miles of the site, is 438 feet in length between the abutments, and 516 feet from end to end of the wing walls, which project from them. There are 7 arches of 54 feet span each, and 9 feet rise, (segments of a circle,) the radius of the intradors of which is 45 feet.

It has in fact been constructed in the manner proposed, as described in the report of Colonels A. and K., and containing 9,788 perches of masonry, (exclusive of the rough walls in which the cut masonry of the wings terminates,) has cost the sum of $125,000.

There are in this aqueduct 25,500 superficial feet of cut ashlar; 11,000 superficial feet of coping; 10,500 superficial feet of sheeting, measuring the intradors only, and rather more than 1,000 lineal feet of water table: in all constituting a work which, while it is highly ornamental, unites, (in the words of Colonels A. and K.) both in its plan and execution, "the true principles of economy, usefulness, and durability."

Controlled as the engineer necessarily was, in his location of the canal, by the rocky and precipitous cliffs which, to a great extent, are washed by the Potomac, while an unusual quantity of rock excavation, on the one hand, was unavoidable, on the other he has judiciously disposed of his materials in the construction of permanent walls for the protection of the canal against the otherwise resistless action of the river; and, for more than one-quarter of the whole distance, an inner paving of stone effectually

secures the towpath from abrasion. Comparatively few repairs, therefore, will be requisite, and the enhanced cost attributable to the more than ordinarily stable character of every part of the work, will eventually result in a saving to the stockholders, which will have proved such expenditures, in the first instance, to have been judicious. Indeed, as suitable materials abound, it is, I think, to be recommended that, as an economical means of their transportation shall be afforded in the use of the canal, timely provision should be made (by deposites of these materials at convenient intervals) for the eventual paving of the towpath throughout its extent, the cost of which, so far, per superficial yard, one foot thick, (when the stone were within 120 feet,) has been but 12½ cents.

The total quantity of excavation and embankment, with the cost of the same, in their several varieties, in order to form the trunk of the canal from the Rock creek basin, at Georgetown, to the Point of Rocks, has been as follows, to wit:

				Aver. per yd.	Common av.
Grubbing,	- - -	12,892			
1,893,666	cubic yds. common excavation,	190,917	- cts.	10	$12\frac{62}{100}$
439,071	do. hard pan,	103,412	-	$23\frac{55}{100}$	
75,472	do. quarry rock,	23,761	-	$31\frac{48}{100}$	$67\frac{46}{100}$
398,524	do. rock blasted,	295,996	-	$74\frac{27}{100}$	
571,121	do. embank. from canal,	75,284	-	-	$13\frac{18}{100}$
962,729	do. do. *not* fr. canal,	185,749	-	-	$19\frac{29}{100}$
97,092	do. puddling,	25,107	-	-	$25\frac{86}{100}$
215,701	cubic perches of walling stone, paid for as excavation	116,407	-	perch	$53\frac{97}{100}$
15,363	cub. per. not paid for as excav'n	15,528	-	-	$1 01$ $\frac{7}{100}$
	Extras - - -	40,800			
	Total -	$1,085,853			

Postponing for the present the further remarks which may be applicable to the portion of canal which, at the date of our inspection, had already been completed, and to which our attention has thus far mainly been confined, I shall next proceed to similar statements of the condition of the work above the Point of Rocks. This, which, as has been stated, extends for a distance of 107 miles from Georgetown, had already so far progressed, that the expectation might be confidently entertained that, by the opening of the coming spring, it will have also been entirely completed. Indeed, the interval between the Point of Rocks and the head of Harper's Ferry falls, (to the completion of which must be postponed the use of that already finished above the introduction of the Seneca feeder, and which, as will be shown, depends for its supply of water on the Potomac, above the Harper's Ferry falls,) a distance of about 14 miles, it was supposed, would, at all events, be finished (as it is believed it has been) by the first of September past, and that, during the current year, the use of the canal would be secured as far as Shepherdstown, 72½ miles from the basin at Georgetown.

These expectations were thought by me to be well founded, and in accordance with the statements furnished me of the work done, compared with that remaining to be done, confirmed by my own observations at the time alluded to. The formation of the canal, including the excavation, embankment, and necessary walling, was, on the 1st of May, more than half completed. The seven locks between the Point of Rocks and Har-

per's Ferry falls were so nearly finished at the time of inspection, that it was estimated that the sum of but $2,000 would suffice to complete them; and, of the remaining ten locks then in progress, about one-third of the work had already been completed.

A comparative view, however, is exhibited of the progress which had been made in the formation of the canal above the Point of Rocks, in the following statement of work *done*, contrasted with that *remaining to be done*.

Work done.

Grubbing - - - -	$7,151 19		cents.
1,516,016 cubic yards excavation of earth,	182,614 49,	av. p. yd.	$12\frac{5}{100}$
253,994 do do rock,	168,348 70,		$66\frac{29}{100}$
262,189 do embank. from canal,	28,567 60,		$10\frac{90}{100}$
394,228 do do *not* from canal,	92,727 56,		$23\frac{52}{100}$
10,167 do puddling - -	1,776 00,		$17\frac{47}{100}$
103,139 perches of walling stone out of the excavation - -	46,950 99,	perch	$45\frac{52}{100}$
3,482 perches of walling stone, not paid for as excavation -	3,208 00,		$92\frac{13}{100}$
Extras - - - - -	2,428 13		
	$533,772 66		

Work to be done.

Grubbing - - - -	$2,501 81		
1,157,889 cubic yards excavation of earth,	133,532 81,	av. p. yd.	$11\frac{53}{100}$
179,758 do do rock,	110,897 95,		$61\frac{69}{100}$
8,150 do do slate,	1,841 00,		$22\frac{59}{100}$
184,569 do embank. from canal,	20,530 63,		$11\frac{12}{100}$
509,163 do do *not* from do	103,733 78,		$20\frac{37}{100}$
27,450 do puddling - -	3,390 75,		$12\frac{35}{100}$
68,168 perches walling of stone out of excavation - - -	32,822 02,	perch	$48\frac{15}{100}$
6,240 perches walling of stone, *not* out of excavation - -	5,794 00,		$92\frac{85}{100}$
Extras - - - - -	6,136 00		
	$421,180 21		

Note.—All earth paid for as excavation, and *hauled more than* 120 *feet*, is considered as embankment from canal, in contradistinction to that obtained from the outside of canal; and, in like manner, there is a division of the wall into walling from stone which comes out of the excavation of the canal, and that which does not.

As it has been stated, below the Point of Rocks, that massive walls were often unavoidable for the support and protection of the canal, so above the Point do the numerous cliffs which impinge upon the stream frequently necessitate a location fruitful in like sources of expense. And as some diversity of opinion seems at one time to have prevailed respecting the *particular* location around the Point of Rocks, or between that spot and Harper's Ferry, my attention was naturally directed to the subject, and it has resulted in the opinion, that whether canal or railroad had been the object *singly*, the engineer, in consulting the interests of either,

could scarce have found a reason for preferring greater exposure of the work, than that which was irremediable, if he would avoid (as he has done in the location of the canal) an undue quantity of rock excavation. Of the extent to which the canal, under the advantages acquired by priority of construction, is notwithstanding washed by the river, or in the occupancy often of a portion of its bed, it will suffice to state that walling has been necessary to its protection for about ten miles of the distance now under contract above the Point of Rocks. On this portion we find also that the paving of the inner slope of the towing path has continued to be judiciously persevered in, whenever a surplus of rock excavation would afford the materials, as was found to be the case for seven miles and nine-tenths, or more than half the entire distance between the Point of Rocks and Harper's Ferry falls. From this last named locality upwards, we have not the means of estimating with precision the extent to which the inner paving will be continued, as it is the last operation incident to the completion of the canal.

The construction of the culverts above the Point of Rocks, so far as they had advanced, was in general satisfactory, and in their general plan and character they correspond with the details given respecting these instructions in the report of Colonels Abert and Kearney, with the exception that the length of those below Harper's Ferry are generally 110 feet, while those above (consequent to the diminished width of the canal) are usually but 100 feet in length. Their other dimensions of course vary with the span of the arch; and the following statement will include such further information as may be desired respecting them.

Between the Point of Rocks and the head of Harper's Ferry falls there are nineteen culverts, which, at the date of the inspection, had already been completed, the dimensions and cost of which are as follows:

	Span of arch in feet.	Number of perches.	Price per perch.	Cost of masonry.	Cost of foundations.	Cost of extra excavation.	Total cost.	
Between the Point of Rocks and Berlin, a distance of seven miles.	8	318	$4 00	$1,272	$76	$456	$1,804	Little Berlin,
	4	182	4 00	728	201	143	1,072	
	12	298	4 50	1,341	106	827	2,274	
	10	487	4 50	2,192	104	682	2,978	
	4	132	4 50	594	38	427	1,059	
	16	795	4 12	3,273	106	332	3,711	
	4	183	4 50	824	36	184	1,044	
	10	504	4 00	2,016	104	257	2,377	
	4	174	4 00	696	36	389	1,121	
	6	311	4 25	1,322	315	101	1,738	
	8	367	4 50	1,652	82	332	2,066	
Between Berlin and the head of Harper's Ferry falls, a distance of seven and one-third miles.	8	360	4 00	1,440	59	190	1,689	
	8	334	4 50	1,503	60	199	1,762	
	6	300	4 00	1,201	53	508	1,762	
	12	589	4 00	2,355	92	790	3,237	
	6	283	4 00	1,132	38	601	1,771	
	6	280	4 50	1,260	260	800	2,320	
	20	751	4 00	3,004	–	506	3,510	
	6	191	4 00	764	–	669	1,433	
	158	6,839	–	$28,569	$1,766	$8,393	$38,728	

The average price, therefore, of this masonry, per perch of 25 cubic feet, has been $4 18, that of foundation $92 95 each, that of culvert pits and extras $441 74 each.

Above the head of Harper's Ferry falls there were, at the date of the inspection, in the progress of construction, (about one-half of the work being then done,) 41 culverts, the estimated cost of which is $44,300, the contract price for the masonry being $4 per perch.

At the Point of Rocks there was under construction, and nearly finished, one of those pivot bridges, which, wherever bridges have been thought necessary from the intersection of the canal with a public road, have been substituted for the permanent bridges which constitute such a source of annoyance on canals generally. The under part of the bridge is 11 feet above the water's surface, the pivot of which rests on a square pier 15 feet in thickness, leaving a breadth of canal 22½ feet on either side of it. Permanent bridges having been entirely dispensed with above Georgetown, (unless the high wooden bridge opposite the Little Falls, see report of Cols. A. and K., page 11, be an exception,) there are of course several of these pivot bridges, (five between Georgetown and Harper's Ferry,) but it has been more usual to effect the passage of the canal by means of road-ways through culverts under the canal, or, where the thoroughfare was less public, by means of ferries. There will be no obstruction, therefore, to the safe and comfortable transportation of passengers on this canal, with such celerity as, amid all the improvements of the age, it shall be found practicable and expedient to attain.*

Having passed the Point of Rocks and the works which succeed it, consisting of walling for the support of the Baltimore and Ohio railroad, (which, for several miles between the Point and the temporary termination of the railroad at Harper's Ferry, is immediately in contact with the canal,) locks Nos. 28 and 29, culverts, &c. at the distance of 53 miles from the Point, the canal crosses the Catoctin, a tributary to the Potomac, on a stone aqueduct, the whole of which, with the exception of the crossing, had already been completed. This aqueduct, No. 3, includes three arches, two of which are semi-circular, of twenty feet span; the

* On the subject of comparative resistance, and consequent cost of transportation at different velocities, with the effect upon the canal from the abrasion of its banks, some curious facts are stated by a Mr. Thomas Grahame, as the results of actual experiment on the Androssan or Paisley canal, which will be found in an address made by him "*To the Canal Proprietors*" in Great Britain, in 1832. He states that the *ordinary speed* for the conveyance of passengers on the Androssan canal, (the narrowest, shallowest, and most curved canal in Scotland,) has, for nearly 2 years, been from *nine to ten miles per hour*, and that "at this rapid speed the banks of the canal have sustained no injury." This he in part ascribes to the shape of the boat, the construction of which he proceeds to describe, and to the discovery that the resistance to the boat, at *high* velocities, is not in the ratio we are accustomed to assign to it. However this may be at variance with ordinarily received opinions, it will surely become those interested to test the truth or fallacy of statements which have been so gravely advanced, by prosecuting their inquiries on the subject, and by instituting experiments, the success of which will so much enhance the value of their enterprise. Indeed, while it becomes us to abstain from speculations which may not be realized, the seriousness with which it is rumored that principles have been introduced in the construction of steamboats now being built at Troy, New York, which are calculated to ply at a speed heretofore deemed almost impracticable, would lead to the inquiry if similar principles may not result in the use of steamboats on canals Be the improvements what they may, however, the dimensions of the Ohio and Chesapeake canal will all the better adapt it to their use; for, however incredulous may be received the opinions we have quoted, we experience no difficulty in subscribing to the belief of the same authority, that far greater results would have obtained on the Paisley canal had its dimensions been enlarged.

third being a semi-ellipsis, of forty feet span and ten feet rise, supported on piers, the height of which is about eight feet above low water. The dimensions of this portion of the piers are six feet in width by thirty-three feet in length, while those of the portion under water (six or seven feet in depth) are eight feet wide by thirty-five feet long. The piers are founded on solid rock. The beds and joints of the face stone above the tops of the piers are cut, their face being left rough, or what is called *rock work*. These stone were obtained from the granite quarries of the Patapsco, and transported forty-six miles on the Baltimore and Ohio railroad to the Point of Rocks, whence they were wagoned three miles to the aqueduct. The masonry below the tops of the piers is of ranged rubble work, the stone for which came boated down the Potomac seven miles, from a quarry near lock 31.

Besides the rough wings, (which cost $2,000.) there are 2,800 perches of masonry laid in water cement. The bottom of the trunk is planked the same as the Monocacy aqueduct. Pilasters at the head of the piers are dispensed with. There is a water table projecting six inches, and the coping, one foot in thickness, projects ten inches. The thickness of the towpath parapet is seven feet, that of the berm parapet five feet, and the width of the water way twenty-one feet.

The total cost of this aqueduct (exclusive of the iron railing with which it is intended to surmount the towing path) is stated to have been $33,500.

Aqueduct No. 4, over the Antietam, which enters the Potomac three miles beyond the Government dam above Harper's Ferry, is 108 feet long between the abutments, which are nine feet thick, and includes three semi-elliptical arches, two of which are twenty-eight feet span, and the third of forty feet span, with a rise each of ten feet. The foundations of the piers and abutments are on rock; the former averaging seven feet in height, two and three-quarters feet of which, called the foundation, is built of rubble work. The remainder of the pier is of cut stone, around the top of which, at the springing of the arch, (twelve feet below the bottom of canal,) there is a belt eight inches in thickness, levelled to six inches, and projecting six inches. There will be a water table projecting nine inches, the thickness of which will be also nine inches, levelled off to six inches, and the coping, ten inches thick, will project nine inches.

Pilasters, four feet in width, commence at the springing line of the arch, and project twenty-one inches at bottom and fifteen inches at top.

Towing path parapet 7 feet thick at bottom, 6 feet at top.

Berm	do	5	do	do	4	do
Width of track		20	do	do	22	do
		32			32	

The ring stones (thirty-nine at each end of the large arch, and thirty-one at the ends of the smaller arches) are two and a half feet in depth at the spring, and two feet at the course. The wings are forty-six feet long, and seven and a half feet thick. The beds and joints of all the face work are cut, the face itself being rough, except the facing of the sheeting, of the pilasters, of the coping, and the water table, the ends of the piers and abutments, which are smooth cut.

This aqueduct is built of lime stone, procured within three-quarters of a mile, and the contract price for the masonry, including coffer dams, excavation, &c. in fine, every thing, (excepting the dressing of the face of the

ring stones, belt, and pilasters, which was not contemplated when the contract was made,) is $7 per perch. It will contain 3,050 perches, of which about three-fourths had been built on the first of June, and the total cost of the whole structure will be $22,850.

Aqueduct No. 5, by which the canal is to be passed over the Conococheague, which enters the Potomac at Williamsport, about one hundred miles from Georgetown, will, from the excellent quality of the material, and the care and skilfulness with which it was being built, be an admirable structure, and in keeping with the best specimens elsewhere met with on this canal. Its abutments and piers (the dimensions of which, as well as other parts of the work, will be found minutely detailed in the accompanying specification furnished me by Mr. Purcell, the resident engineer above Shepherdstown) are founded on the solid rock which, fortunately, forms the bed of the creek; and from these spring the three arches of sixty feet span each, the versed sine of which is fifteen feet. The masonry, of which the aqueduct will include 4,900 perches, is of the character denominated "rock work," excepting the pilasters, ring stones, sheeting, water table, and inside of the parapets, which will be of cut stone, (the whole of which will be laid in cement, mortar, or grouted, or both, as may be directed by the engineer,) will cost $8 per perch. It will be built of a compact blue lime stone, of excellent quality, transported from almost exhaustless quarries within three miles of the site, and may doubtless be entirely completed by the coming spring. Its total cost, it is estimated, will be $40,260.

Having now, as succinctly as we could, described the several aqueducts, let us next attempt an analysis of the cost of the lift locks above the Point of Rocks. The total cost of the seven which lie between the Point and the feeder, at the head of Harper's Ferry falls, and which, as has been stated, were almost completed in June, will have been $56,643 for the masonry, $7,370 for the foundations, $3,850 for the gates, and $10,404 for the excavation of pits, and for the embankments around the locks, (the uniform practice, above the Point of Rocks, having been to estimate the excavation and embankment with the lock:) these several items make an average of $1,280 43 per foot lift for the masonry, gates, and foundations; and, as there are 7,649 perches of masonry in the seven locks, it is equivalent to $7 40 per perch of masonry, to $1,052 89 for each foundation, and to $550 for the gates of each lock.*

*In a lock of eight feet lift, as these in general are, there are in the foundations 2,506 feet lineal of timber 10 by 12 inches; and in the two courses of planking, and in the sheet piling, 17,900 superficial feet (board measure) of two and three inch plank; the price of which at Harper's Ferry, where the plank for these seven locks was mostly obtained, has been for more than a year past from $17 50 to $20 per thousand feet at the saw mill.

There are also in these locks, of eight feet lift, about 1,084 perches of masonry in each; 4,426 superficial feet of ashlar, (excluding coping and hollow quoins;) 436 lineal feet of coping, one foot thick by three feet wide, making four feet of cut work for every foot lineal, and 61⅔ feet rise of hollow quoins; and where the cut stone are exactly of the size required by the specifications, there are 384 perches of the cut stone and 700 perches of backing. The quantity of cement used in the construction of each lock of eight feet lift has varied from 3,000 to 3,300 bushels. That used below Seneca was furnished to the contractor at 40 cents per bushel; from Seneca to the head of Harper's Ferry falls its cost has varied from 30 to 40 cents per bushel; and, generally, above Harper's Ferry falls, (as it has much more conveniently been obtained,) its cost has been, exclusive of transportation, but about 21 cents per bushel of 70 pounds.

Two of the lift locks above the head of Harper's Ferry falls, Nos. 41 and 42, of (10 by 9) 19 feet lift, are to be built of Lawrence dressed lime stone for $800 per foot lift, including gates and foundation; and all the remainder, eight in number, and of 64 feet total lift, are to be of cut stone, at an average price, per contract, of $1,120 per foot lift.

From the foregoing statements, then, it appears that the twenty-seven lift locks below the Point of Rocks, of 217 feet of total lift, built entirely of cut stone, have averaged, including foundations and gates, $1,136 per foot lift; the seven next above the Point of Rocks, (53 feet total lift,) similarly built, $1,280 per foot lift; the eight above the head of Harper's Ferry falls, (64 feet total lift,) built as before, will average $1,120; and the remaining two, (19 feet total lift,) built of hammered stone, will average $800 per foot lift.

The greater cost of the masonry between the Point of Rocks and Harper's Ferry, than elsewhere, is to be attributed to the difficulty with which suitable stone were obtained; as an evidence of which, the contractor for lock No. 30 found it cheaper to go 32½ miles, to Seneca, for his cut stone, than to work any of the quarries nearer; and although the prices for the unfinished work would seem to be a little less than the actual average cost below Harper's Ferry, they are thought to be fully as adequate, considering the greater facility and less cost of obtaining cut stone; that cement will cost less, and that the healthiness of the country is better: this latter cause, especially being one which, as the work advances towards the mountains, may be expected hereafter to operate advantageously to the interests of the company.

Besides these 44 lift locks, which have been enumerated, by which the canal overcomes 353 feet, a communication with the river is to be effected through the guard locks at the entrances of the feeders from the Potomac, and also through the several lift locks designed for the accommodation of the Virginia trade.

One of the latter is directly opposite the junction of the Shenandoah river with the Potomac at Harper's Ferry, 637 yards above lock No. 32. It had been already finished, and is built of rubble masonry, from materials obtained in the vicinity, and in all its dimensions (except the lift, which is ten feet) it is similar to the locks of the canal.

The plan of the canal contemplates, at some future day, a dam across the Potomac, in this vicinity, for the purpose of a feeder, and (which is more important) to form a basin of still water around the point of land on which the town of Harper's Ferry stands. In this event, the lift of the Shenandoah lock would be reduced to eight feet, and the water would enter the canal at the foot of lock No. 32.

Four similar locks are required, to fulfil the conditions of the subscription to the stock of the Canal Company by the State of Virginia, last winter. One opposite the mouth of Goose creek, which enters the Potomac opposite the foot of lock No. 25; another at the Point of Rocks; another opposite Shepherdstown, which had been placed under contract; (see fifth annual report, page 4;) and a fourth near the mouth of Opequon. The purposes of this last will, however, have been subserved, and it will, in consequence, be dispensed with, by the transfer which had been determined on of locks Nos. 41 and 42, "which were about to be commenced two miles above, to a point two miles below the mouth of the Opequon." By this transfer, (the report continues,) and the construction of a towpath along the three miles of steep rocky cliffs immediately above and below Galloway's mills, (by which the slack water navigation between guard lock No. 3 and lock No. 41 is reduced to three instead of seven miles,) about $100,000 will be added to the first 117 miles of improved navigation; which will now include about 104½ miles of independent canal, or

nearly 106 miles, allowing for the extension of the canal 1 mile 373 yards from Rock creek into Washington.

This extent is supplied by five principal feeders from the Potomac, to wit:

1st. The Little Falls feeder, feeding four and two-thirds miles of canal, for the greater part of which distance the canal has eighty feet water surface, and seven feet depth; which dimensions, however, are immediately above the entrance of this feeder, diminished to sixty feet by six feet.

2d. The Seneca feeder, supplying seventeen miles, although, about midway, (at the foot of lock No. 18, at the Great Falls,) an additional supply is received from the Potomac, through a small arch under the towing path.

3d. The next forty miles of canal depends almost entirely on the supply which it receives from the Potomac at the head of Harper's Ferry falls, the only other contribution being from a small feeder from the Tuscarora, which enters the canal seventeen miles below the head of Harper's Ferry falls.

4th. A feeder from the Potomac at dam No. 4, feeding twenty-three and a half miles of canal.

5th. A feeder from the Potomac at dam No. 5, seven miles above Williamsport, feeding nineteen miles of canal.

The admission of the waters of the Little Falls feeder into the canal, near lock No. 5, is regulated by a single guard gate; and that of the Seneca feeder, by a guard lock; for a description of which, as well as of the two *stone dams* connected with these feeders, reference may be had to the report of Colonels A. and K., at which date the canal, with its appendages, was finished and in use as far as the Seneca feeder.

The three next feeders from the Potomac river enter the canal through guard locks No. 2, No. 3, and No. 4, situated, respectively, No. 2, near lock No. 35; No. 3, 1 mile 320 yards above dam No. 4; No. 4, 320 yards above No. 5. They are built of rubble masonry, (at an average cost of about $5 per perch,) of limestone; the first being nearly completed at the date of the inspection, and the two last at that time but recently begun.

Dam No. 3, being the next above the Seneca feeder, (described, as before remarked, in the report of Cols. Abert and Kearney,) is the *Government* dam, for the use of the works connected with the U. S. armory at Harper's Ferry, which has been availed of for the purposes of the canal at the head of Harper's Ferry. The quantity of water, however, which is in consequence now drawn from the Potomac for supplying the canal, is no greater than formerly passed through the long canal, (a sluice around the dam on the Maryland shore, which was kept open until the construction of the present canal required it to be closed;) and the Canal Company is thereby enabled to avoid an expense to which it would otherwise have been subjected.

Dams Nos. 4 *and* 5, by which the supply from the Potomac will be directed into the canal through guard locks 4 and 5, are, in general, similar in their plan, (the details of which will be seen in the specification hereto appended, document C,) which was adopted by the directors after a full investigation of the subject by Mr. Purcell, the engineer, on whose residency these dams are being built.

The results of his extended examinations, which led to the adoption of

this plan, are contained in a report with which I was furnished, and which I have read with interest, and justify the conclusion that they will prove durable, and in all respects answer the purposes for which they are intended.

They are to be built of wood, firmly secured to the rock on which they are founded throughout their lengths, and resting at either end against the solid rock, which in one case forms an abutment; or, where this is not the case, against abutments of rubble masonry laid throughout in hydraulic cement: ample wings extend from these abutments, which, in all, include about 3,000 perches. Their lengths are, respectively, 810 and 706 feet; height 20 feet; base 60 feet; and their conjoint cost, as exhibited in the returns of May 1st, (at which time one-fourth of dam No. 4 had been built, and dam No. 5 had been begun,) is stated at about $80,000.

The foregoing statements will have now furnished, it is hoped, with sufficient minuteness, such details as we have been enabled to collect, (as well from observation as from a careful examination of the archives of the company,) illustrative of the cost, character, and condition of the work. Such, however, as relate to the formation of the canal, are recapitulated in the following *summary*, exhibiting the total amount of excavation and embankment *done* and *to be done* (at the date of the inspection) on the whole canal completed and under contract above its entrance into the Rock creek basin, (exclusive of the additional quantities and cost resulting from the transfer of locks Nos. 41 and 42, as previously stated, four miles down the river,) to wit:

Grubbing, - - - -		$22,545 00			
5,006,642 cub. yds. of earth	-	610.475 76,	av. per yd.	12 19/100
907,698 do	rock - -	599.003 65,	do	65 99/100
8,150 do	slate - -	1,841 00,	do	22 59/100
1,017,809 do	emb'kt from canal	124.382 23,	do	12 22/100
1,866,120 do	em. not from canal	382,210 34,	do	20 48/100
134,709 do	puddling -	30,273 75		
387,008 perches of stone p'd for as excav.		196,180 01,	do perch	50 69/100
25,085 perches *not* p'd for as excavation		24,530 00,	do	97 79/100
Extras - - - -		49,364 13		
		$2,040.805 87		

Of the above amount, the value of the work done of the above description, on the 1st May, was $1,619.625 65; and of that then remaining to be done, $421,180 22; (or, allowing for the transfer of locks 41 and 42, say $521,180;) and the average prices of the whole work, "*done and to be done*," will be as follows, to wit:

Cut stone, stone locks, including foundations and gates, per foot lift, - - - -	$1,156 00	
Excavation of earth, per yard, - - -	12 19/100	*cts.*
Do. rock do. - - -	65 99/100	
Do. slate do. - - -	22 59/100	
Embankment from canal, per cubic yard, - -	12 22/100	
Do. not do. do. - -	20 48/100	
Walling of stone, paid for as excavation, per perch,	50 69/100	
Do. not paid as above, - -	97 79/100	

A review of all the circumstances justifies, in my opinion, the conclusion that, considering the nature and character of the work, prosecuted, as it has frequently been, amid all the disadvantages of sickness, of locality, and consequent interruptions, during the most important season of the year, the above prices can seldom have yielded more than the fair equivalent which is due to the enterprise and industry of the contractor.

As it respects the cross section, or dimensions of the canal, its general width, below the abutment of Harper's Ferry bridge, is sixty feet at the surface, with a depth of six feet, while above the abutment (the depth remaining the same) the breadth is diminished to fifty feet.

In both cases, however, there are exceptions to these general dimensions; as, for instance, between Georgetown and the Little Falls, a distance of five miles, the canal has in general a width of eighty feet, with a depth of seven feet.

These enlarged dimensions, it would appear from the several annual reports of the directors, were adopted in compliance with "the well known object of the express condition attached to the United States subscription of a million of dollars, added to the desire, on the part of the Board, sanctioned by the voice of the stockholders, of promoting the application of water power to domestic manufactures, at the very advantageous sites afforded immediately above, as well as near the termination of the canal."

In other situations, as between the Point of Rocks and Harper's Ferry, we find that, in a distance of twelve miles, the width of canal varies, for three and one-fifth miles, from seventy to eighty, and even one hundred feet; that is, there are of canal 1,520 yards, seventy feet wide; 1,760 yards, seventy-five feet wide; 1,120 yards, eighty feet wide; and 1,240 yards, seventy to one hundred feet wide. But it is to be remarked, that the advantages of these increased widths were here attained without additional cost, and indeed, from the nature of the ground, at less expense than if the regular width of sixty feet, adopted for this portion of canal, had been adhered to.

For like reasons, that is, because of greater economy of construction, above Harper's Ferry, in a distance of forty miles, it has been found expedient to deviate from the regular width of fifty feet, for five and a half miles; or, for

One mile	327	yards, the canal averages		60	feet in width.
Do.	1,228	do.	do.	70	do.
	1,296	do.	do.	80	do.
	180	do.	varies from	60 to 120	do.
	1,605	do.	do.	60 to 150	do.
	810	do.	do.	60 to 200	do.
	810	do.	do.	80 to 150	do.

One mile 976 yards $= 5\frac{55}{100}$ miles.

In contemplation of these dimensions, or rather of those more generally adopted for the cross section of this canal, we are led to remark that (however expedient it may have been to reduce the width above Harper's Ferry, in order that, by husbanding their resources, the company might with greater certainty reap the expected fruits of their enterprise, when the canal should reach the vicinity of the exhaustless coal mines of the Alleghany mountain,) a consideration of the superior advantages of the more

enlarged dimensions, at least justifies, in my opinion, the expectation that a full equivalent for the increased cost attendant on them will hereafter have been realized. They have obtained, it will be recollected, on a portion of the canal, which will not only concentrate almost the whole trade to be derived from successive contributions, in its progress from Cumberland, if not from Pittsburg, towards Georgetown, but on a portion to which will be confined the important accession to the general trade of the canal, in the transportation of the varied products of the fertile and extended valley of the Shenandoah.

An additional motive may also be found to compensate for increased cost of construction, in the greater effect of the moving power, (see calculations on this subject, based on the experiments of D'Alembert, Condorcet, Bossuet, and Dubant, in the report of the United States Board of Internal Improvements made in 1826,) and the consequent reduction in the expense of transportation, which, when it is recollected that this portion of the canal must compete with the Baltimore and Ohio railroad, is not the less calculated to make the canal productive.

Similar reasons do not, to the same extent, obtain, in recommendation of like dimensions, beyond Harper's Ferry; and it is, therefore, in harmony with the principles which govern both the plan and execution of this work, that, above this point, we find its greatest width diminished. I would respectfully submit, however, the opinion which I entertain, that, in the further prosecution of this canal, considerations of cost of construction would have an undue influence, and the utility of the work be impaired, if (at least) the dimensions adopted (although not preferred) by the United States Board of Internal Improvements be not preserved. Peculiar difficulties, resulting from the precipitous cliffs, on the one hand, and the depth of water at their base, on the other, would, however, at particular locations, justify exceptions to any general rule; but, from the knowledge which I have had the opportunity to acquire of the ground to be occupied by this canal throughout its contemplated extent, its minimum width should scarcely, I think, in any case, be less than 40 feet; the increased resistance resulting from which, compared with that on a width of but 48 feet, as shown in the report above alluded to, in which this subject was so fully discussed, is in the ratio of 1.58 to 1.21, or as 130 to 100.

An allusion to peculiar difficulties, encountered by the canal at particular localities, elicits a few remarks in relation to the *Baltimore and Ohio railroad*, which, perhaps, may not be entirely irrelevant to this occasion; for, although a conflict between these two great works has, until recently, been carried on almost from their incipiency, it is at length happily terminated; and it is believed that their interests may be made to harmonize, and the prosecution of both be mutually beneficial. The mineral products of the Alleghany, at the sources of the Potomac, may find an *additional* market for their consumption, through the avenue to be afforded by the Baltimore and Ohio railroad, from the Point of Rocks to Baltimore; while many of the agricultural products of the soil, diverted from the ordinary channels through which they are now directed, (by such facilities as a railroad would afford,) may be made tributary to the trade of the Potomac. At any rate, from the prior occupancy of the ground by the canal, which else had been pursued by the railroad, the conviction has arisen that the construction of the one will have rendered almost impracticable the extension of the other by the route originally contemplated, and

I am led, therefore, to suggest the alternative offered in the facility with which the railroad may be extended *through the valley of the Shenandoah*, in a consideration of the advantages of which, may, perhaps, be found an adequate inducement. (See reports of Col. Long, Dr. William Howard, and Captain McNeill, on the reconnoissance and surveys made in reference to the Baltimore and Ohio railroad, 1828.)

To return from this digression, I would, in conclusion, remark that I have received facilities in the execution of the duty assigned me, which claim my acknowledgments to General Mercer, the president of the company at the date of the inspection, to Messrs. Cruger and Purcell, the two resident engineers, and to Mr. Fisk, an assistant engineer in the service of the company, who accompanied me throughout the examination. A disposition was manifested by all to invite the strictest scrutiny, not only of the manner in which the work had been executed, but also of its cost; and I may not withhold my willing testimony to the highly creditable arrangement of the archives of the company, which, from examination, whether at their office in Washington, or the two residences at Harper's Ferry and Williamsport, is such as to admit of the most ready reference, and to provide for the most satisfactory accountability for the varied disbursements of the company.

Which is respectfully submitted, by, sir,

Your obedient servant,

WM. GIBBS McNEILL,

Capt. Top. Eng'rs.

Document A.

Tide lock at the mouth of Rock creek.	Location. Dist. from lock to lock. Miles.	Yds.	Dist. from tide lock. Miles.	Yds.	Lift, in feet.	Total lockage.	Description of work.	Stone used for the face work, where obtained, &c.
Tide lock -	–	–	–	–	–	–	Cut work - - -	Aquia creek free stone.
Lift do No. 1	–	661	–	661	8	8	Do - - -	
2	–	81.5	–	742.5	8	16	Do - - -	
3	–	100.5	–	843	8	24	Do - - -	
4	–	98	–	941	8	32	Do - - -	
5	4	909	5	90	8	40	The lower six feet of these two locks are of stone, hammer'dressed, the remainder cut work.	The *hammer dressed stone* is from a quarry less than a mile distant. The *cut stone* is from Aquia creek.
6	–	637	5	727	8	48		
7	1	1075	7	42	8	56	Cut work - - -	Granite, except the coping, which is of Aquia creek free stone. The granite is obtained from a quarry within an eighth of a mile.
8	1	594	8	636	8	64	Do - - -	Red sand stone, boated down from the quarries at Seneca, 14½ m.
9	–	604	8	1240	8	72	Do - - -	Built of granite, except the coping, which is of Aquia creek free stone, and a few feet of ashlar, which are of red sand stone, from Seneca. The granite is from the quarry near lock No. 7 ; distance of transportation 1.75 miles by land.
10	–	153	8	1393	8	80	Do - - -	Entirely of granite. One-half from the quarry near the lock No. 7, the other half from a quarry four miles in the country. The transportation comes by land.
11	–	319	8	1712	8	88	Do - - -	Red sand stone, boated down from Seneca, 14 miles.
12	–	545	9	497	8	96	Do - - -	Granite, from the quarry near lock No. 7 ; transported by land 2⅓ miles.
13	–	148	9	645	8	104	Do - - -	Granite, from the quarry in the country, mentioned at lock No. 10 ; transportation by land 4⅓ miles, with the exception of the coping and the hollow quoins, which are from Seneca.
14	–	148	9	793	8	112	Do - - -	Granite, one-half from the quarry in the country referred to, lock No. 10, the other half was boated down from a quarry 5 miles distant.
15	3	1740	13	773	8	120	Do - - -	Red sand stone, boated down from Seneca, 9 miles.
16	–	311	13	1084	8	128	Do - - -	
17	–	618	13	1702	8	136	Do - - -	

18	–	178	14	120	8	144	Cut work	– – –	Red sand stone, boated down from Seneca, 9 miles.
19	–	134	14	252	9	153	Do	– – –	
20	–	198	14	452	8	161	Do	– – –	
21	2	623	16	1075	8	169	Do	– – –	Red sand stone, boated from Seneca, $6\frac{1}{3}$ miles.
22	2	1544	19	859	7	176	Do	– – –	Do in part boated from Seneca, $3\frac{1}{4}$ miles.
23	2	856	21	1715	$8\frac{1}{2}$	$184\frac{1}{2}$	Do	– – –	Do from Seneca, one mile.
24	–	1174	22	1129	$8\frac{1}{2}$	193	Do	– – –	Do do less than half a mile. The masonry of the upper end of this lock is connected with the masonry of the lower abutment of Seneca aqueduct.
25	8	23	30	1152	8	201	Do	– – –	Red sand stone from Seneca, boated $8\frac{1}{2}$ miles
26	8	1137	39	529	8	209	Do	– – –	Red sand stone from Seneca, 17 miles, boated 16 2-3 miles ; land transportation $\frac{1}{3}$ mile.
27	2	20	41	549	8	217	Do	– – –	Red sand stone, boated down 5 miles from a quarry near the river, $2\frac{1}{2}$ miles below the Point of Rocks, with the exception of the coping, which is from Lee's quarry, near Seneca, &c., a few feet of ashlar, which were obtained by land, $2\frac{1}{2}$ miles from the same quarry, whence stone were obtained for the Monocacy aqueduct.
28	To Monoc'y aq. 1156 yds length of do 172 From aq't to pivot bridge at Point of Rocks 6 mls. 1 yard To lock 28 1337 y.		48	118	6	223	Do	– – –	One-seventh of the stone was brought 46 miles on the Baltimore and Ohio railroad (at 6 cents per ton per mile) from the granite quarries of the Patapsco, to the Point of Rocks, and was thence wagoned nearly one mile to the lock. The other six-sevenths of the stone was transported in wagons from a quarry of hard white flint stone in Virginia, four miles.
	7	906	48	1415					
29	1	1597	50	1292	7	230	Do	– – –	*Two-thirds* of the stone were obtained from the granite quarries of the Patapsco, in the same manner as for the last lock. The distance of land transportation from the Point of Rocks to the lock was 2 2-3 miles ; the other third of the face stone was obtained from the quarry in Virginia, referred to at the last lock.
30	4	143	54	1435	8	238	Do	– – –	*One-seventh* of the stone of the Patapsco granite, *one-seventh* of stone found scattered through the neighborhood ; *five-sevenths* of red sand stone boated $32\frac{1}{2}$ miles from Seneca.
	3	121	57	1556	8	264	Do	– – –	Built of stone from different quarries ; a part from the hard white flint stone quarry in Virginia, mentioned at locks Nos. 28 and 29 ; a part was obtained within half a mile, and a part from a granite quarry in Virginia ; the land transportation of which was one mile, and water transportation one and a half mile.

Number of lift locks.	LOCATION. Dist. from lock to lock. Miles.	Yds.	Dist. from tide lock. Miles.	Yds.	Lift, in feet.	Total lockage.	Description of work.	Stone used for the face work, where obtained, &c.
32	2	332	60	128	8	254	Cut work - - -	*One-fifth* of the stone from the granite quarry referred to at the last lock; the transportation from which was in wagons, distance two miles, crossing the two rivers, Shenandoah and Potomac. Four-fifths of the stone were from different lime stone quarries up the Potomac, varying in distance from 2 to 12 miles, the last mile of which was land transportation, the rest water transportation.
33	–	760	60	888	8	262	Do - - -	Built mostly of stone from the granite quarry in Virginia, last referred to; transportation in wagons 1½ mile, crossing the Shenandoah and the Potomac; a small portion of the stone is from Maryland, one mile distant.
	The foot of this lock is connected with the abutment of the bridge over the Potomac at Harper's Ferry.							
34	–	1556	61	684	8	270	Cut work - - -	Built of lime stone from a quarry in Virginia, on the shore of the Potomac; water transportation five miles, land transportation three-quarters of a mile.
35	–	1267	62	191	8	278	Do - - -	Lime stone from quarry last referred to; transportation five miles by water.
36	–	173	62	364	8	286	Do - - -	Do do do do nearly five do.
37	4	909	66	1273	9	295	Do - - -	Do do in Maryland, distant half a mile.
38	5	1426	72	939	5	300	Do - - -	Do do directly opposite on Va. shore of the Potomac.
39	1	287	73	1226	6	306	Do - - -	Do do in Virginia, one mile distant.
40	6	447	85	940	9	315	Do - - -	Do do half mile distant.
41	6	1740	92	920	10	325	} Hammered stone.	
42	–	200	92	1120	9	334	}	
43	–	200	92	1320	9	343	Cut work - - -	Lime stone from a quarry 3 miles distant; land transportation.
44	6	1020	99	580	10	353	Do - - -	Do do do do

DOCUMENT B.

Specifications of the manner of constructing Aqueduct No. 5, designed to convey the water of the Chesapeake and Ohio canal over Conococheague creek.

The aqueduct will be formed with three arched water ways of sixty feet span each.

There will be two piers and two abutments, the piers will be twelve feet thick at the bottom, and eight feet at the top of the skewback; the abutments will be each twelve feet thick, with a buttress projecting five feet from the centre, as represented on the annexed plan. The piers, abutments, and wing walls, shall all be founded on the solid rock that forms the bed of the creek.

The piers will be thirty-two feet long, exclusive of the dome at either end thereof, and these domes will be quarter spheres of eight feet diameter; the piers and abutments will be carried up until within eighteen feet (measured vertically) of the bottom of the canal.

On these piers and abutments will then be erected three arches, thirty-two feet wide, sixty feet span, and fifteen feet rise; the arch stone, or voussoirs, must be of hard, durable stone, and fashioned so that the first or skewback course, composed of them, shall be three feet, and the crown or key course two and a half feet deep; and these arch stones shall not be less than fourteen inches thick at the nose, or intrados; they must also be so laid in the work as to break joints, no lap being less than twelve inches, nor shall any arch stone be less than three feet long on its face. The spandrils shall be laid of good large flat stone; and the arches and spandrils shall be grouted in the manner hereinafter mentioned.

On the arches and spandrils shall be erected the parapet walls as follows: the parapet on the towpath side to be seven feet thick at the bottom, and six and a half feet at the top; and that on the berm side to be five feet thick at the bottom, and four and a half feet at the top, and both walls to be raised seven feet above the bottom of the canal.

On the exterior sides of the aqueduct, and between the top of the arches and the parapets, will be inserted a water table or string course, eight inches thick in the main, levelled to six inches on the face, and the whole to be two feet broad, and project six inches beyond the face of the parapet.

The parapet and wing walls will be covered with a coping of stone ten inches thick, and projecting on the exterior surface of the wall six inches.

The wing walls shall be built of the form and thickness shown on the annexed plan, and the manner of building them shall be similar to that prescribed for the parapets.

The stone for the arches, the ends of the piers and abutments, the skewback, the water table, the domes and coping of the parapets and wings, shall be well and smoothly cut, and all the remaining face stone, both for the water ways and exterior faces, shall be of good hammer-dressed range work.

No course of stone will be permitted to enter either the abutments or piers, that shall be less than fourteen inches thick, with a bed two feet broad; nor will any course be permitted to enter any part of the work, that shall be less than ten inches thick, and have a bed less than eighteen inches broad. There must be a header or bond stone at each ten feet in

length of every course, and each header must be at least three feet long on the face.

The bottom of the trunk (or water way) between the parapet walls shall be laid with approved hard burned brick, laid on the edge, and bedded in a good bed of cement mortar, one inch deep, and the grout made to fill between the bricks half an inch above their upper side. This floor of brick to extend entirely between the parapets, and from outside to outside of the abutments.

The whole of the masonry shall be laid in cement mortar or grouted, or both, as may be directed by the engineer; the grout and mortar shall be composed of equal parts of clear, sharp sand and approved hydraulic lime, except the wings, in which the grout may be composed of two parts sand to one of water lime. The grouting shall be done at each course in height as the walls progress. Iron rods and clamps, to connect the arch and other stones, shall be inserted when required by the engineers, and every part of the work shall be done under his inspection, and any part thereof taken down and rebuilt that he shall not approve.

Document C.

Specification of the manner of constructing dam No. 4, at section No. 156, of the Chesapeake and Ohio canal.

The manner of building the dam will be as follows:

All the earth, gravel, and loose stone shall be first removed from the place to be occupied by the foundation timbers, and on the solid rock shall be laid and firmly bolted, with iron bolts, three rows of timber 12 inches square, 30 feet apart, and extending entirely across the river. These timbers shall be accurately fitted to the rock, especially the up stream log, which shall be scribed and fitted so as to be as nearly water tight as practicable.

These foundation timbers shall be bolted, at each 10 feet of their length, with iron bolts 1½ inches square, passing through the timber and penetrating the rock not less than two feet; the lower end of the bolts to be fastened with reversed iron wedges.

On the down stream side of the dam an apron must be formed by laying timbers 12 inches thick, not less than 12 inches broad, and 15 feet long, with their edges in contact, their upper ends abutting against the lower transverse timber, and their direction being with the stream, or at right angles to the dam; in this position they must be securely bolted to the rock, with not less than two bolts to each timber, said bolts to be of the size and length before described.

After the three rows of timber, first mentioned, have been securely fastened to the rock, they shall be connected together by sound white oak ties 32 feet long, 10 inches diameter, dovetailed at each end; and the dovetails must be accurately and tightly fitted into the tenons made in the timbers to receive them.

Wherever a tie connects with a timber, it must be fastened with a locust pin of two inches in diameter, and 24 inches long. These ties must be inserted in every course of timbers at each 10 feet in length of the dam:

the first 8 or 10 courses of ties will be secured alternately to the timbers and the rock at the bottom of the river; when to the latter, the ends will be bolted as before described.

When the first mentioned three rows of timber, extending across the river, shall have been bolted to the rock, and secured together by the ties, another course of timbers shall be laid on them so fitted that the space between the under side of one timber, and the upper side of the other, shall not be more than one inch. The centre and up stream logs shall be carried up plumb one over the other; but the down stream side or course shall each recede six inches up stream from the face of the log next below, thus forming on the lower side of the dam a succession of steps; in this manner the last laid course of timbers must be secured to the timber underneath by locust pins, driven at the distance of 16 feet apart; these pins to be two inches in diameter and thirty inches long, with a reversed wedge in their lower ends. This course of timber will then be tenoned and secured by dovetailed ties in the same manner as directed in the last course.

In this manner the dam will progress until the down stream side is eighteen inches below its intended height, and the up stream is 18 feet lower than the down stream side, and the whole space between the timbers, and under the ties, being filled, as it progresses, with stone well packed away. On the sloping surface, now presented by the dam, when thus far formed, shall be securely bolted to the timbers a course of ties 10 inches thick, flattened on the upper side.

These ties will be placed at intervals of four feet, and must be 52 feet long. They must be braced from the timbers forming the cribs, so as to sustain them on the centre; these braces to be 10 inches thick, and placed at an angle of 45 degrees. The centre course of timbers must be braced from its upper log to the lower log of the down stream side.

On the last mentioned course of ties, must be framed and fitted fifteen courses of white oak timber 12 by 6 inches, be flush with the face of the ties, and fastened to said ties with ten inch locust pins at their intersection with every tie.

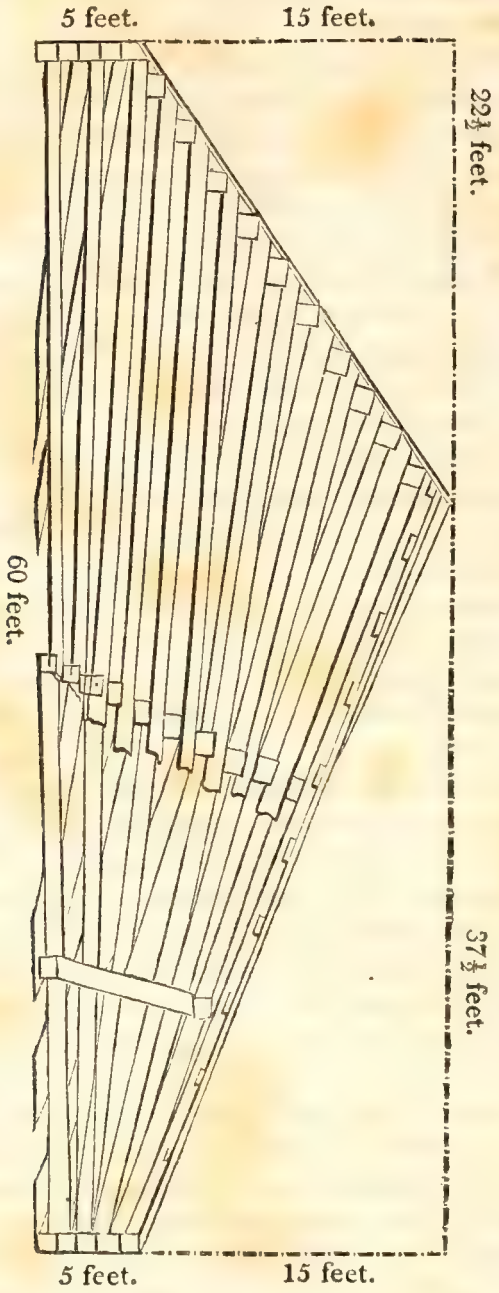
The point of the dam, on the up stream side, must be sheet piled with two inch plank, well scribed and fitted to the rock at the bottom of the river. The whole upper surface of the dam must be covered with four inch plank well and tightly jointed. These planks to be secured with nine inch wrought iron spikes; on the top of these planks must be secured ice guards four inches thick at the butt, and tapering to an edge, each guard plank to be 12 feet long, and to be fastened with fifteen inch wrought iron spikes.

The up stream side of the dam will be well gravelled.

There will be an abutment only on the Maryland end of the dam, built of good rubble masonry laid in water proof cement.

The engineer shall, at any time, have the right to increase or diminish the quantity of iron used, and to reject any timber or plank he may consider unfit for the work.

Sketch of dams Nos. 4 and 5, according to the altered plan



CHESAPEAKE AND OHIO CANAL—ACT OF VIRGINIA.

[To accompany bill H. R. No. 470.]

MAY 9, 1834.

Printed by order of the House of Representatives.

An act further to amend the act incorporating the Chesapeake and Ohio Canal Company, passed February 27, 1829.

Be it enacted by the General Assembly, That the Chesapeake and Ohio Canal Company be, and they are hereby, empowered, whenever it shall be, in the judgment of the President and Directors thereof, expedient, in lieu of bridges, to substitute boats, properly fitted for the transportation of persons, wagons, and carriages, of every description, across the canal, wherever a public or private road shall render a bridge or ferry necessary, and such road cannot be conducted conveniently under the canal.

Be it further enacted, That the said President and Directors, acting in behalf of the said company, and with the consent and approbation thereof, expressed at some general meeting thereof, in which a majority in interest of the stock of the company is represented, may sell, let, or otherwise dispose of any surplus water in any part of said canal, or of any feeder or reservoir thereof, if they shall be of opinion that no injury will result therefrom to the navigation of the canal.

Be it further enacted, That whenever it may be necessary to form heavy embankments, piers, or moles at the mouths of creeks, or along the river shore, for basins and other purposes, and the President and Directors may deem it expedient to give a greater strength to the same, by widening them, and constructing them of the most solid materials, the ground so formed for such useful purpose may by them, when so improved, be sold out or let for terms of years, as they may deem most expedient for the company, on such conditions as may direct the application of the proceeds thereof to useful purposes, and at the same time repay the necessary expense of the formation of such embankments, piers, or moles: *Provided*, that this power shall in no case be exercised so as to injure the navigation of the canal.

This act shall be in force, so far as it relates to the eastern section of the said canal, on its receiving the assent of the Legislature of Maryland and of the Congress of the United States, and shall be valid, as relates to both sections, on its receiving the further assent of the Legislature of Pennsylvania.

[Gales & Seaton, print.]

...ms Nos. 4 and 5

VIRGINIA, *City of Richmond, to wit:*

I, George W. Munford, keeper of the rolls of the commonwealth of Virginia, do hereby certify that the foregoing is a true copy of the act above mentioned, passed by the Legislature February 27, 1829. Given under my hand this 26th of February, 1830.

GEORGE W. MUNFORD,
Keeper of the Rolls of Virginia.

23d Congress, 1st Session. [Doc. No. 37.] Ho. of Reps.

PENNSYLVANIA.

MEMORIAL

OF

THE CHAMBER OF COMMERCE OF PHILADELPHIA,

Praying Congress to restore the public deposites to the Bank of the United States.

JANUARY 13, 1834.

Referred to the Committee of Ways and Means.

To the honorable the Senate and House of Representatives of the United States in Congress assembled:

The memorial of the Chamber of Commerce of the city of Philadelphia

RESPECTFULLY REPRESENTS:

That, prompted by a strong sense of duty, and viewing, with serious alarm, the present crisis in the money concerns of the country, the undersigned confidently apply to Congress for relief, under whose guardianship and control the currency of the nation has been specially placed by the letter as well as the spirit of the constitution.

Among the indications of wide spread and rapidly increasing distress, the recent expression of public opinion, by the largest assemblage of people, without distinction of party, ever witnessed in this city, is not the least impressive, and the following facts, in addition, will satisfy your honorable bodies that there is neither exaggeration nor coloring in the assertion here made, that the prevailing panic and pressure for money, and the gloomy forebodings of the future, are without a precedent in the experience of this country: in proof of this allegation, the Chamber of Commerce refers, with pain,

To the decline in price of the public and incorporated stocks generally, which varies from 10 to 30 per cent.:

To the depression of the foreign and domestic exchanges, and the extreme difficulty of negotiating bills:

To the fall in value of all the staple articles of domestic produce, whether for export or home consumption:

To the impracticability of borrowing, as heretofore, on mortgage, even at the highest legal rate of interest, and the ruinous discount now current on good mercantile paper, which varies from 12 to 18 per cent. per annum:

To the difficulty of obtaining cash advances on produce or merchandise from factors or commission merchants, who refuse to contract engagements with which they may not be able to comply :

To the inability of contractors for State loans, or the subscribers to corporate stocks, to pay up their instalments, and the great danger of a suspension of the public improvements, from the difficulty of borrowing, and the consequent disappointment and ruin of the contractors for the public works :

To the discharge from employ of laborers and workmen, and the suspension of business in the various mechanical and manufacturing pursuits:

To the decline, in value, of real estate, both in town and country :

To the inability of some of the corporate companies to pay the interest due on their borrowed money, or of the State banks to discount new paper, or do more than renew their previous loans ; and, in fine, to the suspension of all commercial confidence, the complete stagnation of business in every department of industry, and the bankruptcies and embarrassment consequent on such a state of affairs :

To the necessity imposed on the Bank of the United States of contracting its accommodations, and guarding against the attempts to cripple its resources, and decry its credit, not only by a withdrawal of the public deposites, but by a combined and systematic proscription and perversion of all its operations, even when dictated by self-preservation.

In regard to the cause of the frightful conjuncture here depicted, your memorialists feel it due to candor to point, unreservedly, to the removal of the public funds as the immediate and only one to which the present pecuniary distress can be rationally attributed.

They are unable to conceive how, in good faith or sound policy, a National Bank, created, among other objects, for the express purpose of restoring specie payments, of regulating and maintaining a pure and unvitiated currency ; an institution, at once the fiscal agent and copartner of the Government, to the extent of one-fifth of its capital, can be crushed and destroyed, without burying beneath its ruins all the great interests of the country, with which its existence is indissolubly connected. Would the downfall of the Bank (it is respectfully asked) benefit the condition of the Government and the people? Would not such an event, on the contrary, draw into its vortex all the State banks, and lead infallibly to a suspension of specie payments ?

Fear and distrust are gradually ripening (as your memorialists believe) into desperation and despair, and must paralyze and derange the diversified concerns of the whole country, embracing, at this moment, not less than *one thousand millions of dollars* of property, which is in a constant state of motion and transit throughout the vast extent of this Union.

Among the most alarming proofs of declining credit and reputation abroad, is the fact that considerable parcels of American stocks have recently been returned from London as unsaleable ; and it cannot be disguised that the high confidence of European capitalists, heretofore reposed in the security of our State loans and bank stocks, has been so shaken by the attempts to discredit and destroy our own Government Bank, as to have produced the most disastrous reaction in the market here, followed by a reduction in value, unprecedented both in the rates and rapidity of the decline.

Heretofore our merchants have been able to effect loans upon a deposite

or sale of American stocks in London, as best suited their convenience, and the demand for our public improvements; but these facilities and resources are now cut off by the withdrawal of that confidence upon which alone they rested, and that at a moment when our extensive operations in canals and railroads have rendered the exigency peculiarly mischievous and embarrassing.

Although the undersigned abstain from the discussion of mere political questions, which Congress alone are competent to decide, yet, in matters involving the rights and interests of the community, they look with confidence to the power reposed by the constitution in your honorable bodies, as the true and legitimate source of relief.

In recurring to that instrument, they find that the exclusive authority to coin money and regulate the currency, is reserved to the Federal Government, and that the States are specially prohibited from exercising that vital function of sovereignty, and can neither issue bills of credit, nor make any thing but gold and silver a legal tender in payment of debts. It is therefore apparent that, in applying a remedy for the existing evils, Congress would be only exercising the same constitutional power, under which it has *twice* created a National Bank, which has been in operation thirty-six years of the forty-four of our political existence. It was under that provision of the constitution which authorizes Congress to coin money and fix the value of the precious metals, (and, by consequence, the value of their paper representative,) that the currency of the country has hitherto been regulated, and confidence and stability imparted to the pecuniary transactions and exchanges of the Union, excepting only that period from 1811 to 1816, between the expiration of the charter of the first Bank and the establishment of the present Bank of the United States, when specie payments were suspended by the State banks. This circumstance conveys a salutary admonition in regard to the importance and necessity of a National Bank, to check and restrain excessive issues of notes by the *State institutions*, and shows their utter incompetence to furnish a safe and universal currency, inasmuch as it was through the instrumentality and agency of the present Bank of the United States *alone* that specie payments were finally resumed, and the money concerns of the country restored to their former sound condition. There are some peculiarities in the currency of the United States, as contrasted with that of Great Britain and France, which deserve the most serious consideration of Congress, and which subject it to dangerous fluctuations, unknown in those countries with whom we are most intimately connected in trade and exchanges. These fluctuations, particularly incident to a circulation extending over twenty-four States, and resting upon a very limited metallic basis, obviously require the utmost vigilance of the National Legislature to preserve it from frequent convulsions, and the danger of a suspension of specie payments. The liability to such a catastrophe is just in proportion to the various laws, provisions, and regulations of the States in which these banks are established, and to the amount of specie in their vaults, which, in the safety fund banks of New York, appears, by late official returns, to be only 5½ per cent. on their capitals. France incurs no risk from these causes; her currency is *all metallic*, except about one-tenth. That of Great Britain is *half* of gold and silver, and *half* of Bank notes; and her great National Bank has therefore little comparative difficulty in restraining the issues of the country banks, which are moreover control-

led by *fourteen branches*, which will probably be soon increased in number. The currency of the United States consists of the notes of 400 banks, including that of our National Bank, the aggregate capitals of which are about two hundred millions of dollars; the notes in circulation are one hundred millions, and the deposites estimated at fifty millions of dollars; making altogether one hundred and fifty millions of dollars of currency in Bank notes and deposites, which are sustained by only twenty millions in specie *in the vaults of all the banks*. Here then is an aggregate mass of three hundred and fifty millions, (exclusive of negotiable mercantile notes, to an immense amount,) all resting upon *confidence*, and upon only twenty millions of specie, for its support. Now, as the Bank of the United States possesses one-half of the specie in the vaults of all the banks, to wit, ten millions of dollars, and has moreover large balances due to it and its branches by the State banks, the inference is not less clear than satisfactory, that Congress holds, by means of the Bank of the United States, a salutary control over the issues of the State banks, and is able to restrain and regulate their operations, so as to keep them within the limits necessary for their own safety as well as that of the country. This control will be seen and acknowledged by all acquainted with the principles of banking, to be essential to the security of a currency composed almost entirely of paper, and so very inferior in its metallic basis to that of England and France.

From these data your memorialists respectfully submit that a National Bank, whose notes circulate and command specie in every quarter of the Union, is the surest friend and support of the State banks, and that its own safety is identified with, and absolutely requires that it should aid and protect all the sound State institutions.

One of the greatest dangers the undersigned conceive, to which the currency and public and private credit are now exposed, is the loss of that confidence abroad which rendered our public stocks and loans a sure and safe remittance to England, and which consequently diminished the drain and export of specie when the rate of exchange was above par standard, to the same extent in which our stocks can be sold and retained in Europe. It is therefore obvious, that unless confidence in our public securities can be restored, by preserving our national faith, that the moment exchange rises beyond the real par value, the specie of the country will be drained from the banks as a remittance to Europe, and leave them with empty vaults to deplore a second time (when too late to be corrected) the fatal policy of suspending specie payments.

There is, indeed, too much reason to apprehend that the injury and shock which American credit has sustained in Europe by the late impeachment of the stability of our National Bank, will not easily be repaired and overcome; but if ever that stain on our reputation is to be washed away, it can only be done by preserving good faith with the stockholders of the Bank, (both foreign and domestic,) and restoring the public deposites to its safe keeping, in conformity to the conditions of its charter. And they beg leave to add their solemn conviction that the system of internal improvements, by roads and canals, now in progress in Pennsylvania and throughout the United States, will, if aided and sustained by a sound currency, through the instrumentality of a National Bank, be the best guaranty for the perpetuity of the Union, and the prosperity and happiness of the American people. They are moreover thoroughly satis-

fied that the interest of the State banks is not only compatible with the existence of a National Bank, but that each in its proper sphere is necessary and useful to the other.

In conclusion, your memorialists respectfully pray your honorable bodies to cause the *public deposites* to be *restored* to the *Bank of the United States*, as due in good faith to the stockholders in that institution, and to the great interests of the nation.

ROBERT RALSTON, *President*
Of the Philadelphia Chamber of Commerce.
L. CLAPIER, *Vice President.*
THOS. P. COPE, *Vice President.*

Attest: JNO. VAUGHAN,
Secretary of Phila. Cham. of Commerce.

PHILADELPHIA, *7th January*, 1834.

23d Congress, 1st Session. [Rep. No. 414.] Ho. of Reps.

CHESAPEAKE AND OHIO CANAL.

[To accompany bill H. R. No. 94.]

April 17, 1834.

Mr. Mercer, from the Committee on Roads and Canals, made the following

REPORT:

The Committee on Roads and Canals, to which, were referred the memorials of the Chesapeake and Ohio Canal, and of the Baltimore and Ohio Railroad Companies, as well as numerous petitions from the inhabitants of Virginia, Maryland, and Pennsylvania, praying for an additional subscription, by the United States, to the capital stock of the Chesapeake and Ohio canal, report, in part:

That, prior to their concurrence in favor of the bill now before the House of Representatives, authorizing a further subscription of ten thousand shares to the stock of the Chesapeake and Ohio canal, oral statements were made to them of the progress and present condition of the affairs of the Chesapeake and Ohio Canal Company; which they were assured, would be officially verified by written returns, then expected, from the engineers of the company, of the actual state of the various works on the canal, involving minute details of their cost, and the manner of their construction.

These details, coming down to the 1st of April, 1834, it is the purpose of this report to communicate to the House, along with the considerations which prompted the committee to recommend the proposed subscription.

For the better comprehension of the nature and importance of the enterprise, to which they relate, and of the origin of the subscription to its stock, already made by the Government of the United States, the committee deem it expedient, to premise a history of the Chesapeake and Ohio canal.

The current belief, that an easy communication, *by means of a short portage over land*, could be effected between the Potomac and Ohio, and, consequently, between all the Eastern and Western waters of the United States, existed long prior to their union, under one independent government. As early as the year 1749, a land and trading association, composed of some of the most opulent and respectable inhabitants of the colonies of Virginia and Maryland, had purchased a large tract of country of the Indians, and, under the title of "The Ohio Company," constructed a warehouse, for the reception of goods, at Fort, now the town of Cumberland, on the left bank of the Potomac. By means of the Indian paths

[Gales & Seaton, print.]

across the intervening mountains, they carried on an extensive traffic with the various savage tribes on the waters of the Monongahela, the Youghiogeny, and the Ohio.

Their goods, imported from Great Britain, then the mother country, into the town of Belhaven, now called Alexandria, were carried eighteen miles over land, to the head of the Great Falls of Potomac, and there transferred to barges, from which, they were relanded, at Cumberland, after a voyage of one hundred and seventy-six miles. In the year 1755, the unfortunate General Braddock, after debarking a British army at Belhaven, and marching to the head of the Great Falls, ascended the river Potomac to Fort Cumberland; whence, he constructed the first carriage-way across the Alleghany, a road still bearing his name.

The natural condition of the navigation of the Potomac is minutely described in certain printed proposals, for its improvement, published in the city of London, in February, 1773; while Doctor Benjamin Franklin and Governor Pownall, along with Thomas Walpole, Samuel Wharton, and other English gentlemen of influence, were endeavoring, with a prospect of success, to prevail on the British Crown to establish a new province, west of the Alleghany, upon the waters of the Great Kenhawa and Monongahela. Printed copies of these proposals are still to be found among the papers of the last agent of the Ohio Company. That they attracted the notice of General George Washington, one of whose ancestors, the proprietor of Mount Vernon, was a member of that company, is manifest from an endorsement, in his hand, on a copy of them originally filed among the records of the Potomac Company. The cares and perils of the revolution, in which he laid the foundation of the independence and freedom of his country, had scarcely passed, when he invited the attention of Maryland and Virginia to the improvement of the navigation of the Potomac, and its connexion, by short portages, across the intervening mountains, with the navigable waters of the Cheat, the Monongahela, and the Youghiogeny rivers. His accurate knowledge of a country, in the military protection of which, from savage incursion, he had been engaged for several years, combined with the intimate acquaintance which he subsequently formed, while acting on a more extended theatre, with all the other practicable channels of communication between the Eastern and Western waters, induced him to pronounce the opinion, that the portage, which he proposed to effect, between the Potomac and some of the head waters of the Ohio, combined with the improvement of their navigation, would prove the shortest, cheapest, and, consequently, the best connexion that could be formed, between the Atlantic and the Western Territory of the United States. Accordingly, at a meeting of commissioners, on behalf of the States of Virginia and Maryland, held at Annapolis on the 22d of December, 1784, at which he presided, he laid the foundation of the charter of the late Potomac Company; to the capital stock of which, both States liberally subscribed. The joint act of incorporation stated its object to be "the extension of the navigation of Potomac river, from tide water, to the highest place practicable on the North Branch:" and the fourth section of the act, for the attainment of this purpose, authorized the President and Directors of the Company "to construct canals, and erect such locks, and perform such other works, as they may judge necessary, for opening, improving, and extending the navigation of the river, above tide water."

To the very limited knowledge of the science and practice of civil en-

gineering, existing in the United States at that early period, and to the yet more limited resources of a people impoverished by a long continued war for their independence, is to be ascribed, the ultimate failure of the Potomac Company to realize the wise and patriotic views which gave it birth. The mode of improvement which the company adopted, was found, after much experience, to be radically defective. The labor of more than forty years, and the expenditure of more than seven hundred thousand dollars, including all their tolls, except a single dividend of four per cent., left the *ascending* navigation of the Potomac, at all seasons, as laborious and expensive as the use of the adjacent turnpike roads; while the *descending* navigation continued to be, as it had been prior to any improvement of the bed of the river, totally suspended, during the far greater part of every year, for want of a sufficient depth of water.

To collect a part of this shoal water, and conduct it along the same valley, in a continuous canal of sufficient breadth and depth for the purpose of easy and constant navigation, offered the best, if not the only adequate remedy for this natural defect; and accordingly, the board of public works of Virginia, a few years after their incorporation, directed their principal engineer, in compliance with a resolution of the General Assembly of the 8th of January, 1820, to "examine the waters of the Potomac above the upper line of the District of Columbia; and to explore the country between the Potomac and Ohio, on the one side, and the Potomac and Rappahannock on the other, with a view to ascertain and report upon the practicability of effecting a communication, by canal, between the three rivers." The result of this survey was communicated by the Governor, the ex officio President of the Board, in a report to the General Assembly of Virginia, in December, 1820.

The practicability of uniting the navigable waters of the Potomac with the Ohio, by one continued canal, was then, for the first time, publicly affirmed and demonstrated. The report of Thomas Moore minutely described both *the route*, and the *mode of effecting* such a connexion.

Attracting the attention of a sister State, this report was followed, early in 1821, by the appointment of four commissioners, on the part of Virginia and Maryland, "jointly to examine the affairs of the Potomac Company, the state of the navigation of the river Potomac, and its susceptibility of improvement; and to make report whether the company had complied with the terms of its charter; if not, its ability so to comply, within a reasonable time; and whether any, and what aid should be given to the company; and what would be the best means of effecting an improvement in the navigation of the river."

The commissioners were empowered to call to their aid suitable engineers; and they, accordingly, associated Isaac Briggs of Maryland, with Thomas Moore, in making their examinations, surveys, and estimates. Their concurrent report confirmed, in the most important particulars, that which had been separately made by the principal engineer of Virginia; and was transmitted, by the commissioners, to their respective Executives; and, by them, to their Legislatures, in January 1823.

Prior to this date, however, legislative action, on this subject, had been begun in Congress, by a report of a committee, presented on the 3d of May, 1822, to the House of Representatives, in relation to sundry memorials of the citizens of Pennsylvania, Maryland, and Virginia, requesting the pecuniary aid of the United States, to enable the Potomac Company further to improve the navigation of that river.

The report not only sanctioned the object of the memorialists, but adopted, and recommended to the attention of the House, the suggestion of the General Assembly and of the chief engineer of Virginia, to extend the contemplated improvement. westwardly, to the navigable waters of the Ohio.

In the following winter, separate acts, to incorporate a joint stock association, entitled "the Potomac *Canal* Company," were passed by the Legislatures of Maryland and Virginia, with the unanimous assent and approbation of the Potomac Company, expressed by their resolution of the 3d of February, 1823, "to surrender their charter," upon liberal conditions, to any company that might be incorporated, for the purpose of extending a canal, along the valley of the river, towards the base of the Alleghany. These acts proved, however, abortive. They disagreed in some of their provisions, and omitted any reference whatever, to the necessary co-operation of the United States, in the proposed work, as the exclusive sovereign of the District of Columbia, in which all the market towns of the Potomac are situated, and the canal was to find its eastern termination.

To *unite* the counsels of the friends of the proposed improvement, and to devise, at the same time, the best *practical means of extending its object*, to a union of the Potomac with the Ohio, and of both with Lake Erie, a public meeting, held on the 25th day of August, 1823, in the town of Leesburg, in Virginia, through a committee of their body, invited their fellow-citizens of that State, and of the adjacent States of Maryland, Pennsylvania, and Ohio, and the District of Columbia, to depute representatives to a convention for the above purpose, to be held in the city of Washington on the 6th of November following. (See App. A.)

Pursuant to this invitation, a numerous assembly of delegates chosen by the citizens of those States, and of the cities and counties of the District of Columbia, met on the appointed day, in the Capitol of the United States, and by a series of resolutions, adopted with extraordinary unanimity, concerted a plan for the attainment of their common object, the execution of which they confided, on their adjournment, to a standing "central committee" of their body. The same convention, enlarged by the choice of other delegates, reassembled in the same city, on the 6th of December, 1826, on the invitation and notice of their central committee, and closed a session of three days in the hall of the House of Representatives, after having passed various resolutions, enlarging the number, and extending the powers of their standing committee. (App. B.)

In allusion to the first assemblage of this convention, the President of the United States, in his annual message, delivered on the 3d of December, 1823, at the opening of the first session of the eighteenth Congress, recommended their object in the following impressive language: "Many patriotic and enlightened citizens," says Mr. Monroe, "who have made this subject an object of particular investigation, are of opinion that the waters of the Chesapeake and Ohio may be connected together by one continued canal, and at an expense far short of the value and importance of the object to be obtained. If this could be accomplished, it is impossible to calculate the beneficial consequences which would result from it. A great portion of the produce of the very fertile country through which it would pass, would find a market through that channel. Troops might be moved with great facility in war, with cannon and every kind of munition, in either direction. Connecting the Atlantic with the Western country, n a line passing through the seat of the National Government, it would

contribute essentially to strengthen the bond of union itself. Believing, as I do, that Congress possess the right to appropriate money for such a national object, (the jurisdiction remaining to the States through which the canal would pass,) I submit it to your consideration whether it may not be advisable to authorize, by an adequate appropriation, the employment of a suitable number of the officers of the corps of engineers to examine the *unexplored* ground, during the next season, and to report their opinion thereon. It will likewise be proper to extend their examination to the several routes through which the waters of the Ohio may be connected, by canals, with those of Lake Erie." The President thus embraced in his annual message the entire purpose of the Washington convention; and, doubtless, laid the foundation of the subsequent act of the same session of Congress, authorizing the Executive to cause to be procured the necessary surveys, plans, and estimates of such roads and canals as he might deem expedient, "with a view to the transportation of the mail, the commercial intercourse, and military defence of the United States."

The central committee of the convention, shortly after their appointment, transmitted copies of a bill to incorporate the Chesapeake and Ohio Canal Company, to the Legislatures of Virginia, Maryland, and Pennsylvania, deferring a similar application, to Congress, until the States of Virginia and Maryland, without whose concurrence nothing could be effected, should have agreed on the terms of the proposed charter.

The Virginia act of incorporation bears date the 27th of January, 1824; that of Maryland one year after, having been passed during the session of her Legislature which began in December, 1824. Both acts were promptly confirmed by one of Congress, approved on the 3d of March, 1825. After twice rejecting the application of the central committee, Pennsylvania passed an act of similar tenor in all respects, except that her concurrence was coupled with certain conditions, on the 9th of February, 1826, when, with this exception, the charter became complete.

The preamble of the charter recites that its purpose is "to establish a connected navigation between the Eastern and Western waters, so as to extend and multiply the means and facilities of internal commerce and personal intercourse between the two great sections of the United States, and to interweave more closely all the mutual interests and affections that are calculated to perpetuate the vital principles of union." The following sections of the act propose to accomplish this laudable purpose, by constructing "a navigable canal from the tide water of the Potomac, in the District of Columbia," along the valley of that river, and across the Alleghany, "to some convenient point on the waters of the Ohio, or of some one of its tributary streams."

To avoid popular objections to tunnelling the mountain, an amendment of the original act of incorporation authorizes the connexion of those rivers by a *railway*, or a *canal*, as might be found most expedient. The charter divides the whole line of canal into two sections, denominated, respectively, eastern and western. It terminates the former in the valley of the Potomac; and provides that the latter may intersect that river, either at Cumberland, or at the mouth of Savage creek. It requires the breadth of the canal to be not less than forty, and its depth to be not less than four feet. Allowing two years from the organization of the Canal Company for its commencement, twelve more are allowed, from the date of its commencement, for the completion of its *eastern section;* and, after its completion,

two years are given, for beginning, and six, for completing the western section. The capital authorized to be subscribed is nominally six millions; upon the subscription of a fourth of which sum, the subscribers were to become incorporated, with power to enlarge their capital, by further subscriptions, to the extent of their necessities.

The connexion of the Ohio with Lake Erie, a part of the original purpose of the Washington convention, though not comprehended in this charter, was by no means abandoned. A committee was deputed, by the convention, to memorialize the Legislature of the State of Ohio on that subject; which was discreetly left to the concurrent action of that State, and of her neighbor, Pennsylvania, in order to avoid the complexity and probable delay, of making a fifth party, to a measure, already requiring the assent of four Legislatures; and not only the consent, but a surrender of the rights of an existing company, incorporated by two of those Legislatures, for the attainment of a part, though a part only, of the same general object.

While these acts of legislation, with many and various amendments of them, comprehending three several acts of Virginia, seven of Maryland, two of Pennsylvania, and four of Congress, in all, sixteen in number, were maturing the charter of a joint stock company, examinations and surveys, preparatory to the commencement of the contemplated canal, were instituted by order of the President of the United States, under the authority of the survey act of the 30th April, 1824.

The first two of those examinations were of distinct routes across the Alleghany; the one leaving the Potomac at the mouth of Savage, the other at the mouth of Wills' creek. Both were conducted under the immediate inspection of a "Board of Internal Improvement," composed, by order of the President, through the Department of War, dated the 31st of May, 1824, of Brigadier General S. Bernard and Lieutenant Colonel Totten, officers of the army of the United States, and John L. Sullivan, a civil engineer, of the State of Massachusetts.

Two reports, in relation to the route, by the mouth of Savage, were made by this Board, (the last named member of it reporting separately;) and were communicated to Congress, by a message from the President, of the 14th February, 1825.

The report of the United States engineers confirmed the practicability of the contemplated union of the Eastern and Western waters, to the full extent of the most sanguine hopes of the Washington convention. They say to the chief of the corps of engineers, that, "In execution of the orders of the Secretary of War, communicated in your letter of the 31st of May last, to make a reconnoissance of the country between the waters of the Potomac and the head of the steamboat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining *the practicability* of a communication between those points; of designating the most suitable route for the same; and of forming plans and estimates, in detail, of the expense of execution; the Board proceeded from the seat of Government, through the portion of country indicated therein."

"Having deliberately examined every local circumstance, on that part of the Alleghany mountain, which lies between the head waters of the Potomac and those of the Youghiogeny, a branch of the Monongahela, the Board prepared instructions for the preliminary surveys and measurements, to be executed by the topographical engineers and other officers and gentlemen, attached for this service; and, having, now, maturely con-

sidered the circumstances observed by them personally, and carefully studied the results of such of these preliminary surveys as are completed, *they are decidedly of opinion that the communication is practicable.*" "The Board, on viewing the country *between the Ohio and Lake Erie*, along various lines indicated by public opinion, became possessed of such facts, as place the practicability of canalling, from the head of the steamboat navigation *in the Ohio, to Lake Erie, beyond all doubt.*"

In a subsequent part of the same report, they add, that "the investigation of the topography and watercourses of the country through which the Chesapeake and Ohio canal should run, and the results of our preparatory surveys, obtained up to the present moment, *demonstrate that this noble enterprise is practicable:* and, although we have not yet sufficient data to calculate the expense of the work, there is every probability that it will not bear any comparison with the political, commercial, and military advantages, which it will procure to the Union."

"In conclusion," the separate report of Mr. Sullivan, designed to illustrate and confirm that of his military associates, after having affirmed "*the quantity of water*" capable of being drawn to the summit level of the canal, "*to be more than treble that required,*" says that "no difficulty has been diminished or magnified. The obstacle to a communication, by the Potomac route, to the Western States, lessens to a point, compared with the magnitude of the object, whether in a commercial or political relation to the prosperity of the country. In Europe, their canals, even those of Governments, have all some definite, limited object of utility. But here it is not alone the distance, the elevation, the vast natural navigation to be connected, which constitutes the grandeur of the design; but the immense interests which it combines into a harmonious natural whole." Speaking of the connexion between "*the Ohio and the lakes,*" he says expressly, that "we saw no difficulty in making a canal from the mouth of Beaver to the mouth of Elk, in the distance of a little more than one hundred miles."

In the message of the President to the House of Representatives, accompanying these reports, he says, in confirmation of the opinion he had expressed in his message of the 3d of December, 1823: "From the views I have taken of these reports, I contemplate results *of incalculable advantage to our Union*, because I see in them, *the most satisfactory proof*, that certain impediments, which had a tendency to embarrass the intercourse between some of its most important sections, *may be removed without serious difficulty;* and that facilities may be afforded, in other quarters,* which will have the happiest effect. Of the right of Congress to promote these great results, by the appropriation of the public money, in harmony with the States to be affected by them, having already communicated my sentiments fully, and on mature consideration, I deem it unnecessary to enlarge at this time."

The above message and reports were unaccompanied by any detailed estimate of the probable cost of the proposed communication.

Prior to any such estimate, a further examination of the country lying between the Potomac and Ohio, disclosed to the "Board of Internal Im-

* Among the reports here alluded to, were plans for effecting the long contemplated connexion of Buzzard's with Barnstable bay, and the tide water of Taunton river and Narragansett bay with Boston harbor—works strongly recommended, as forming part of a line of inland navigation along the seacoast of the United States, from Boston, in Massachusetts, to the river St. John's, in East Florida.

provement" a route across the intervening mountains, more secure from accidental injury, or suspension; shorter by eighteen miles; requiring eight hundred and seventy-three feet less lockage; supplied with an equal quantity of water, at the summit level; and cheaper than the former, by more than half a million of dollars. This route leaves the Potomac at Cumberland, thirty miles below the mouth of Savage, and intersects Casselman's river, a branch of the Youghiogeny, at the distance of seventy miles, after passing the Alleghany, by a tunnel of four miles; the entire cost of which is included in the comparative estimate of the two routes in contemplation.

An elaborate report, accompanied by maps, plans, and very minute estimates, *assuming, as unquestionable, the practicability of both routes*, but giving a decided preference to that, by Casselman's river, was transmitted by President Adams to the House of Representatives, on the 7th of December, 1826. It computed the entire cost of the canal at more than twenty-two millions of dollars; and that, of the eastern, or Potomac section alone, at more than eight million one hundred and seventy thousand, exclusive of any allowance whatever, for land condemnations, or the usual estimate of contingencies.*

Having been communicated, by the Board of Internal Improvement, to the Secretary of War, in the preceding month of October, this estimate astounded many of the friends of the canal. Attracting the attention of the central committee of the Washington convention, it gave rise to a second meeting of that body, as it subsequently did, to a letter of the 13th of March, 1827, from thirty-two members of Congress, representing, in part, ten States of the Union, requesting of the President of the United States a re-examination of the proposed route for the Chesapeake and Ohio canal, *by two practical civil engineers;* who should be instructed to test, as they proceeded in another examination and survey, the accuracy, both in principle and detail, of all the prior estimates of the same work.

This request was promptly complied with by Mr. Adams, and Messrs. James Geddes and Nathan S. Roberts, two civil engineers of established reputation, who had been employed in the construction of the canals of New York, and subsequently engaged in the service of Pennsylvania, (the last being then the chief engineer of the western division of the great canal of that State.) were deputed, to perform the very important and delicate trust of revising the estimates of the Board of Internal Improvement. A part of their detailed report was communicated, through the Secretary of War, to the Committee on Roads and Canals of the House of Representatives, as early, as the 7th of January, 1828, and their entire report, to the House, accompanied by a letter from the Secretary, on the 15th of March following; two months before the subscription to the stock of the Chesapeake and Ohio canal, authorized by the act of Congress of the 24th of May of the same year.

The length of the line of canal between Pittsburg, and the basin, proposed by the Board of Internal Improvement to be constructed *at the market-house* in Georgetown, the Board made 341 miles and 676 yards; of which, the eastern section, lying exclusively in the valley of the Potomac, between Cumberland and Georgetown, comprehended 185 miles and 1,078 yards; the western, 85 miles and 1,010 yards, being the distance from

*In this report Dr. William Howard, of Maryland, was united, in place of Mr. Sullivan, with General Bernard; and Captain Wm. Tell Poussin, of the corps of Topographical Engineers, in place of Colonel Totten.

Casselman's river to Pittsburg; and their middle section, or interval between Cumberland and Casselman's river, 70 miles and 1,010 yards. The two last divisions, taken together, extend from Cumberland to Pittsburg, are in length 155 miles 1,358 yards, and constitute the "Western Section" according to the terms of the charter.

The plan of canal proposed by the Board of Engineers, to use their own language, had "a breadth at bottom of 38 feet; at the surface of 48 feet; the depth of water 5 feet; the towpath 9 feet wide; the guard banks 5 feet at the top; the surf berms kept on the level of the water, 2 feet wide each; towpath and tops of the guard bank 2 feet above the surface of the canal; the transverse section to be modified where local circumstances require it, and more especially in the cases of deep cutting, steep side cutting, embanking, and also where the canal is to be supported by walls." "In the framing of the plan," the Board say in their report that "a due attention has been paid to these modifications, with a view to conciliate the convenience of the work, with the strictest economy. The depth of five feet has been preserved throughout the line, but the *breadth* has been *often much lessened.*" "The locks have 102 feet between the hollow quoins, and 14 feet breadth in the clear; the main walls are built of *common range work masonry*; their facing *only* is laid with *water* cement. The aqueducts are to be built of masonry, and their lengths calculated to afford a free passage to the streams at the time of freshets." Whether their face stone was designed to be cut, or merely hammered, does not appear in their description of the aqueducts.

The United States engineers estimated the cost of the entire canal, on the preceding plan, at $22.375,429 69, of which, they computed their middle section alone, to cost $10,028,122 86; the eastern $8,170,223 98; and the western $4,170,223 78. In these estimates, they comprehend an allowance for additional fencing, as well as bridges; but make none whatever for contingencies, which are usually computed at 10 per cent.; nor for land purchases or condemnations, which have been found to be a heavy item in the actual expenditures of the Chesapeake and Ohio Canal Company.

Messrs. Geddes and Roberts, for want of sufficient time, returned a complete estimate for the eastern section alone;* and their survey, which began at Cumberland, terminated at the upper boundary of Georgetown, 2 miles and 278 yards below the old tide locks of the Potomac Company. They made the length of this section 186 miles and 1,353 yards; and applied their estimates, successively, to a canal of three several dimensions, passing, as nearly as practicable, over the same ground. For 60 miles and 1,054 yards, comprehending all "high and all river embankments, all steep hill side cutting, and deep excavation of earth or rock," they limit the canal to 40 feet breadth at the surface; the breadth of the *narrowest* of their canals; which is supposed to have but 28 feet breadth at bottom, with but 4 feet depth of water, and with locks only 90 feet by 15 in their chamber, being, in all respects, the dimensions of the canals of New York and Ohio.

The second plan to which their estimates apply, enlarges the canal for 126 miles and 299 yards, to the exact dimensions of that of the United States Board of Internal Improvement.

The third estimate was for a canal, to use the language of the report, "as recommended *by the Committee on Roads and Canals*, enlarged, *where*

* This omission has been since amply supplied by a laborious survey, and a detailed estimate of the western section, made by order of the Canal Board.

practicable by common excavation, to 60 feet at the surface, with a proportionate breadth at bottom. which is computed to be 42 feet; and 5 feet depth of water." The locks, in the third, are to be of the same dimensions as in the second plan. The enlarged dimensions were made to extend, as in that plan, to 126 only, of the 186¾ miles, between Cumberland and the upper boundary of Georgetown, where the survey of Messrs. Geddes and Roberts ended.

The estimates, including 10 per cent. for contingencies, but excluding any allowance for the purchase or condemnation of land or water rights, were, for the first canal $4,008,005 28, or $21,461 87 per mile; for the second, $4,330,991 68, or $23,191 38 per mile; and for the third, $4,479,346 93, or $23,985 79 per mile.

The prior estimate of the United States Board of Internal Improvement supposed the eastern section of the canal to terminate a few hundred yards lower down, than the point, to which the estimate of Messrs. Geddes and Roberts descended; and the former included, also, a basin between Bridge and Water streets, near the market-house in Georgetown, and computed its cost at $10,842.

The estimate of Messrs. Geddes and Roberts reduced the cost of the eastern section of the Chesapeake and Ohio canal below the most ardent hopes of the friends of that enterprise.

In the report of the central committee, to whom a deputation from Pittsburg, consisting of Harmar Denny and James S. Crafts, Esqs. had been previously sent, in order to correct the errors of the alarming estimate of the United States Board of Engineers, the committee state to the convention, at the opening of its second session, in December, 1826, that, "while they render every just tribute to the labor, learning, and ability of the Board of Internal Improvement, they are led, by their own experience, and by information derived from sources entitled to the highest respect and confidence, to question the accuracy of such portions of their estimates, as present to the judgment, facts, occurring daily within the sphere of common observation, rather than in the paths of scientific research. Such, for example," say the committee, "are the wages of labor, and the prices of the materials required for the construction of those parts of a canal, which resemble the ordinary works of the coarsest arts in the adjacent country; such, also, are the quantities, and, consequently, the values of the labor which can be performed on such works, by ordinary artificers and workmen, in any given time. To ascertain these particulars, by inquiries from a source, in which the Board and the public could not but confide, constituted one of the objects which prompted the central committee to invite the convention to reassemble in the city of Washington, and to extend that invitation to other counties and corporations interested in the purpose of its deliberations, but which were unrepresented at the former meeting. Among a body so constituted, and a people previously apprised of the objects of its reunion, there would be found, it was supposed, many individuals, who derive from their own observation, or would come charged with the results of the experience of others, as to the details of an estimate of the probable cost of the labor and materials required for the very simple purposes of excavating, embanking, walling, and paving a canal, and fencing along its border."

"The *quantity* of each species of this *work*, to be executed on any section or subdivision of the canal, depends, it is true," says this report, "on estimates founded on a scientific application of the structure or plan of the

canal, to the ground along which it is to extend, and on the quality of that ground; but that quantity being ascertained, and the manner of *its* execution determined, science has performed its office; and common experience, combined with an actual acquaintance with the resources of the country, must do the rest.

"Confining their remarks, for the present, to the estimates of the eastern section of the canal, which the Board propose to terminate at Cumberland, the distance of 186 miles from Georgetown, it appears that they have computed the cost of that section at $8,177,081 05 for excavation, embankments, walling, lockage, aqueducts, culverts, bridges, puddling, paving, dams, waste weirs, and gates, fencing, basins, and certain items not reducible to any general head of expenditure, but few in number, and amounting, together, to an inconsiderable sum.

"Of the specific heads, the five first mentioned cover near seven-eighths of the total cost of this section, in the proportions,

For excavation, of - - - - -	$2,515,176 46
embankments, - - - - -	685,456 11
walling, - - - - -	2,737,808 68
lockage, including guard locks, - - -	997,300 00
aqueducts, - - - - - -	521,696 00
Being a total amount of - - - -	$7,457,437 25

"Of the residue, or $719,643 70 of the estimated cost of this section, culverts, bridges, puddling, paving, and fencing, make up the sum of $532,109 11 more, leaving, for miscellaneous items, $178,534 59.

"The lowest price allowed for excavation is 14 cents the cubic yard, and the highest $1 65. The price per cubic yard, for embankments, varies between 12 and 42 cents. Of walling, 31 miles, the cost is from $3 to $5 18 cents the cubic yard, which makes the cost per mile, in lineal extent, average more than $88,000. The lift locks are computed, throughout, at $1,500 the foot lift. The masonry of the aqueducts, it is presumed, according to the same data. The puddling, amounting to $122,186, at 12 cents the square yard of 18 inches thickness: the paving, amounting in cost to $122,186, at 82 cents the square yard; and 175 miles of fencing, at $900 the mile.

"The committee have arrived at some of these results, with some care, and at some expense of time, in reviewing, during the short period allowed them, a work of much labor.

"They forbear to anticipate the judgment of the convention on an estimate adjusted to the compensation of one dollar a day for a common laborer, at work for ten hours, in a country abounding with the necessaries of life, and already possessing, along the greater part of the line of the canal, some of the advantages of navigation, to equalize their value, and where peculiar causes conspire to check the sudden rise of the wages of ordinary labor; and this price, extended to its humblest offices, is, moreover, augmented for the attendants in the subterranean tunnel, and in employments of like exposure.

"In an estimate, believed by the committee to exceed in amount the probable cost of this section of the canal, they have reduced these specific expenditures to 5,000,000 dollars, allowing, as part of that sum, four hundred thousand for unforeseen contingencies.

"The committee doubt not but that this estimate might be yet further reduced, and that the estimates of the other sections of the canal would admit of a larger ratable deduction, since peculiar errors enter into their formation; as a computation for the tunnels and the reverse arches, at the bottoms of the locks, of hard burnt bricks, of dimensions reduced to eight inches in length and two in thickness, but of four inches breadth, at $5 per thousand, on a supposition that but 60,000 of such bricks could be supplied by a kiln of 100,000, burnt in a country where wood is a nuisance; that common limestone does not exist, because it does not appear on the surface of the earth; and that lime, for water-proof cement, cannot be had nearer than the canal of New York, although it had not been searched for in the country most requiring its use: and it has, in fact, the committee is credibly informed, been since discovered there in great abundance, on the margin of a Western river.

"Those errors, if they are such, in a very able and valuable report, do not affect, in any degree, the merit of its authors, as scientific men, nor are the committee prompted to note them, but by an imperious sense of duty.

"To the unassuming personal and moral worth, and to the indefatigable industry of the distinguished member at the head of the Board of Internal Improvement, they unite with their fellow-citizens, in according the well-earned meed of public applause; nor do they withhold their thanks from his coadjutors in a work of equal labor and skill. The Board have failed, only where less ability was competent to the task which they have endeavored to perform, under impressions, perhaps, that the work, which they estimated, would readily command the wealth of a nation for its construction, and with feelings which would be less wounded by the discovery that they had under, rather than overrated its cost.

"Of their errors it should also be remarked, that, in the patient and ingenious analysis of their constituent elements, the Board have afforded an easy corrective, since they have left nothing to be supplied by those who follow them, but the labor of common sense, guided by the knowledge of common experience.

"In one of the estimates, submitted to the convention in 1823, the transverse section of the Chesapeake and Ohio canal was assumed to be, at the water line, 40 feet, at the base, 28 feet, with a depth of four, which, multiplied by the mean breadth between them, gave a surface of 136 square feet; while the canal, estimated by the Board, having a mean breadth of 40.5 feet, and a depth of five feet, has for its transverse section below its water line a superfices of 202.5 square feet in extent, and would cost, for excavation alone, according to the estimates of the Board, $858,000 less than that which they have recommended, and this without any reference whatever to several circumstances in the ground over which the two canals would pass, tending much to augment the cost of that which has the greater breadth.

"It was, therefore, with a prudent regard to the practicability of obtaining funds for the accomplishment of this great work, that the Federal and State commissioners have forborne to open books for the subscription of its stock, not only until the estimates of the Board had been received, but until some calculation might be made of the extent of the aid that may be derived from those sources of wealth, on which a work of such vast political importance naturally relies for the means of its execution.

"While the private subscriber to its stock may, indeed should be expected to regulate the amount of his subscription to such an enterprise, by a consideration of its immediate or remote returns in the shape of dividends or profit; while the cities, whose trade may be advanced by it, shall blend with this consideration, that of the augmented value which its success must bestow upon their fixed and active capital; the States so deeply interested in it may be expected to regard this prospective income as of inconsiderable moment, compared with the internal resources which so extended a line of inland navigation must promptly develop; the wealth which it must generate, employ, and enlarge; the population which it must attract, fix, and multiply; and the Government of the United States, strong as is its obligation to the District of Columbia, of which the founders of the Federal Republic have constituted it the paternal guardian, must more sensibly feel that, by the accomplishment of such an enterprise, a new momentum will be imparted to its defensive power, whether exercised upon the land or the sea, and an indestructible bond provided for the Union, and with it the prosperity of the people, for whose security, freedom, and happiness, it was instituted.

"Whether the powerful appeals which these interests and obligations address to the councils of the States and of the Union, shall be successful, futurity only can determine. It is for the convention to hasten its favorable decree, by presenting to those councils the ardent wishes, the just hopes, and the confident expectations, of their numerous constituents."

These copious extracts from the proceedings of that convention of citizens, to which the Chesapeake and Ohio canal owes both its name and its existence, manifest the extreme caution with which the friends of this great enterprise proceeded towards its accomplishment.

Their charter, with the amendments required to complete it, has been shown to have required the steady labor of five years; and to have involved the passage of sixteen different acts of legislation. Although their memorials, inviting a subscription of stock, were several years before Congress, until the final report of Messrs. Geddes and Roberts, in 1828, had confirmed the reduced estimate of the central committee, the action of the House of Representatives on the otherwise favorable reports of successive committees of that body, was not pressed by the numerous advocates of the measure in Congress.

It was doubtless the manifestation of this prudence and circumspection, which gave to the act authorizing the subscription of a million of dollars to the stock of the canal, so large a majority, on its passage through the House of Representatives, and secured for it the decisive sanction of the Senate.

The commissioners appointed in June, 1825, by the United States and the States of Maryland and Virginia, having concurred in this delay, did not open books for the subscription of stock to the canal, till the first day of October, 1827; on the second day of which month, an unconditional subscription, exceeding a million and a half of dollars, being more than one-fourth of the capital required by the charter, had incorporated the subscribers, according to its provisions. To enlarge this sum, by the addition of half a million, subscribed by the State of Maryland, and a fourth of a million by the Corporation of Alexandria, both sums being conditionally subscribed, it was necessary to await the expected subscription of a million by the United States.

The organization of the company, by the election of its officers, was, therefore, postponed by the commissioners until after the passage of the act of Congress, approved on the 24th of May, 1828.

On the 20th of June, being as early as practicable, with due notice to the stockholders, the first general meeting was convened in Washington. They elected their officers; enacted certain by-laws; and, before their adjournment, passed the resolutions necessary to give validity to the Pennsylvania act of incorporation, requiring the western terminus of the canal to be at Pittsburg; and to the subscription of Maryland, one of the conditions of which was, that it should be payable in the 5 per cent. stock of that State.

At this period, the available capital of the company consisted of the following sums:

Of 10,000	shares	subscribed	by the United States,	equivalent to	$1,000,000
10,000	"	"	city of Washington,	"	1,000,000
5,000	"	"	State of Maryland,	"	500,000
2,500	"	"	town of Alexandria,	"	250,000
2,500	"	"	Georgetown,	"	250,000
and 6,084	"	"	by private individuals, including 20 by the Corporation of Shepherdstown, in Virginia,		608,400

Making an aggregate number of 36,084 shares, and a value of $3,608,400 applicable to the construction of the canal.

The subscription of the United States diffused universal joy throughout the extensive country interested in this great enterprise; and, in unison with this grateful feeling, the Canal Board fixed on the approaching 4th of July, for its nominal commencement, and invited the participation of the Chief Magistrate of the United States in its ceremonial.

Accordingly, on the fifty-second anniversary of American independence, John Quincy Adams, President of the United States, in the presence of the representatives of several foreign nations, and of a vast concourse of his fellow-citizens, after an appropriate address, dug the first spadefull of earth from the channel of the Chesapeake and Ohio canal.

On the 15th of August, the Potomac Company surrendered, by deed, its chartered rights, to the new company. It was not, however, before the ensuing October, that the new canal was, in effect, begun; pursuant to the contracts for the construction of the thirty-four sections, being seventeen miles of it, which had been made on the 20th of August, 1828.

On the 25th of the ensuing October, fifty additional sections were placed under contract; comprehending the remaining space, between the head of Seneca falls and the "Point of Rocks," and all the masonry of the eighty-four sections, between the foot of the Kitoctan mountain, and the junction of the new canal with the works of the Potomac Company at the Little Falls: the contracts for the masonry of the sections let in August, having awaited the discovery of suitable stone, in convenient situations, and of hydraulic lime, of a quality to be relied on, for the construction of the locks, aqueducts, and culverts. Special agents were deputed to explore both shores of the river, as well as the adjacent country, for these essential materials; and the successful issue of their search was published prior to the October contracts.

On the 5th of the ensuing December, a distance of five miles, between

the Little Falls feeder and the mouth of Rock creek, which separates Washington from Georgetown, was divided into eight sections, and placed under contract. The line of canal, thus let out for construction, in the first five months after the organization of the company, was laid out and marked on the ground, by Doctor John Martineau, a civil engineer, of New York, under the supervision of another eminent civil engineer, Benjamin Wright, Esq. of the same State, then, and for two years after, acting engineer in chief of the Chesapeake and Ohio Canal Company.

The ninety-two sections comprehend, in a line of forty-eight miles, two aqueducts; one of three, and the other of seven arches of fifty-four feet span each; seventy-four culverts, of which many are enlarged to serve for roadways under the canal, and substitutes for ferries or bridges over it; a dam across the Potomac, at the head of the Little Falls, 1,750 feet long, and another, at the head of Seneca falls, of 2,500 feet; twenty-seven lift locks, exclusive of a tide lock and a guard lock; seventeen houses for lockkeepers, two of which are enlarged, to serve, also, as places of rest and accommodation for passengers; three feeders from the river, and one from an intermediate stream introduced at little cost; several basins, one of which, designed as a capacious harbor for boats, is sustained by a mole across Rock creek, erected in twenty feet water, in length 1,000, and breadth 160 feet, through which, a lock connects the navigation of the canal, with the tide of the Potomac and the Chesapeake.

By the 1st of October, 1830, in less than two years from its commencement, the most difficult part of this work had been completed; and the formidable and dangerous obstructions to the river navigation, between Seneca and tide water, removed by overcoming an ascent of 195 feet in a distance of twenty miles.

The 78th section, within three miles of the "Point of Rocks," containing 30,000 yards of excavation, was the work of 111 days, ending with the 6th of May, 1829.

At this point, the further progress of the canal had been arrested, immediately after the organization of the company, by an injunction of the Chancellor of Maryland, issued on the 25th of June, 1828, at the suit of the Baltimore and Ohio Railroad Company. This legal obstruction, having been confirmed by the Chancellor, continued till the reversal of his decision, by the judgment of the Court of Appeals of Maryland, pronounced on the 5th of January, 1831. During this long period, exceeding three and a half years, the portion of the canal between Seneca falls and the "Point of Rocks," awaited a supply of water from Harper's Ferry, the intended position of the third dam and fourth feeder from the river Potomac. To reach this feeder, it was necessary, not only that the legal obstruction which impeded the progress of the canal should be removed, but that, after its removal, the canal should be extended fourteen miles above the "Point of Rocks," through the disputed ground; a work, in itself, of very difficult and laborious construction.

As soon, therefore, as the final issue of the legal controversy, depending at Annapolis, the Board of Directors proceeded to place under contract, the twenty-eight sections, between the "Point of Rocks" and the head of Harper's Ferry falls; where there was a dam already erected by the Government of the United States. The sections regarded as the most difficult to construct, were let with despatch, to experienced contractors, selected by the Board, from the whole number in their service, so as to bring into use,

as speedily as possible, the twenty-six miles of canal, then nearly completed, between the "Point of Rocks" and Seneca: on which, the capital expended had long laid dead, and would obviously so continue, until the necessary supply of water, for its navigation, could be brought from above.

At the same period, the portion of the line was also let, which lies between the Rock creek basin, and the mouth of Tiber creek, in the city of Washington, the fixed eastern termination of the Chesapeake and Ohio Canal.

The charter of the company having required that one hundred miles of the eastern section should be completed in five years from its commencement, the Board diligently proceeded, without claiming protection from the illegal impediments thrown in their way, to place under contract, thirty-six miles of canal, next above the head of Harper's Ferry falls; which, added to the sixty-four miles already let, below, would make up one hundred. As the best situation for a dam across the Potomac, required for the fifth feeder from the river, was found to be eight miles above Williamsport, and one hundred and nine above the basin of Tiber creek, the contracts of June and August, 1831, were extended through that distance, except for the seven miles immediately above the dam erected across the Potomac, between Williamsport and Shepherdstown; along the slack water of which, it was deemed expedient to substitute a temporary towpath, for a canal, till the remaining one hundred and two miles should be completed.

The State of Virginia having, however, in February, 1833, subscribed 250,000 dollars to the stock of the company, and a compromise effected under the sanction of an act of the General Assembly of Maryland, with the Baltimore and Ohio Railroad Company having added the further sum of 186,000 dollars to the available funds of the company, the Canal Board proceeded, in the ensuing month of May, by further contracts, to substitute a continuation of the canal, for the towpath, through four of the seven miles above mentioned.

Of the whole line of canal, the progress of which has thus been very minutely detailed, 64 miles were completed, and capable of navigation, in October, 1833. Of the residue of the line, under contract, it is ascertained that 21 miles await, to be brought into use, the completion of a single lock only, and the aqueduct across Antietam creek, the labor of a few weeks. The line of 24 miles passing from dam No. 4, by Williamsport, it is very confidently stated, can be readily completed in the present year: the far greater portion of it being already done, and the delay of the residue imputable to the extension of the line, under contract, in May last, by transferring the river locks, from a point two miles above, to one two miles below the mouth of Opeccon, in compliance with a condition of the late Virginia subscription. But for the intervention of the cholera, in the autumn of each of the last two years, all the works let in 1831 would have been completed, as the contracts for their construction required, in the spring of 1833. The annexed reports of the Board of Directors, to the stockholders, and of Capt. McNeill, of the corps of engineers, to the Department of War, will manifest the grounds of this belief, and the condition of all the works completed or under contract, as well as of the funds of the company, prior to the general meeting in June last. (Vid. App. C.)

By the compromise effected with the Railroad Company, and the subscription of Virginia, as has been stated, apart from the favorable moral influence of both events, the effective resources of the canal were considerably augmented.

It now appears, from a statement of Mr. C. B. Fisk, the engineer superintending the graduation of the railroad, at the points of interference between it and the canal, that, by replacing the sum which had been expended, prior to the compromise, on the Frederick county road at Harper's Ferry, and the economical though yet faithful construction of the work undertaken by the Canal Company, accompanied with a slight reduction of the breadth of the canal, for short distances, at the above points, the compromise will be made to enlarge the canal fund by the addition of $186,000.

The capital stock of the company, exclusive of that payable in the stock and debts of the old Potomac Company, amounted, at the general meeting in June, 1833, to $3,858,400, payable in money; that paid in the stock of the Potomac Company, to $209,707 31: and that paid in the debts of the company, to $46,804 31; making a capital of $4,114,911 62: of which, $3,858,400 may be considered as efficient stock, entitled to immediate dividends.

The charter which provides for the conversion of the stock, and debt of the old, into the stock of the new company, expressly limits the amount of the one to $311,111 11, and of the other to $175,800; but defers the right to claim a dividend on either, till the subscribers of the capital, payable in current coin, shall have received an income of ten per cent. per annum.

If to the available capital subscribed, there be added, the sum which had been received from the Railroad Company, on the 1st of January last, with that, to become due after that date, along with the tolls collected prior to that period, and certain miscellaneous items, amounting to $11,592 37, the total amount of the work paid for, and of the available funds of the company, for its further prosecution, will be found to have been $4,050,992 37, exclusive of $55,000 borrowed of certain banks, and charged upon the payments of the Baltimore and Ohio Railroad Company. This loan did not add to those resources, but arose from anticipating the collection of a part of them.*

By referring to the Treasurer's monthly abstract of December 31, 1833, and the amount of stock then and since subscribed, the receipts and disbursements of the company, and the state of their funds on the 1st day of January, will appear to have been as follows:

There had been received $3,927,716 63, in the several sums, and from the sources following, viz.

On account of the capital stock paid in by the subscribers,		$3,589,252 64
"	the compromise with the Balt. & O. R. R. Co.	177,333 35
"	tolls to the 31st of December, 1833, -	94,538 27
"	old houses and materials sold, - -	514 80
"	sums paid agents and refunded, - -	752 31
"	profit on the sale of Maryland stock, -	4,703 03
"	interest received from delinquent subscribers,	989 79
"	costs of suit recovered, - - -	3,847 62
"	the Potomac Company, being the proceeds of debts due them at the date of the transfer of their charter, and of unclaimed dividends,	784 82
"	loans negotiated at several banks, - -	55,000 00
Making the aggregate amount of receipts, as above,		$3,927,716 63

* The preceding date was assumed, under the impression that time would not be allowed bring this account down to a later period.

And there had been then expended, the following sums, on the following objects, viz.

On the construction of the canal, including $82,604 10 laid out in three years' repairs and improvements, and $65,477 56 expended in the graduation of $4\frac{1}{10}$ miles of railroad, - - -	3,325,908	65
On the acquisition of lands, and the attendant expenses of juries, and fees of sheriffs and counsel, - - -	171,471	62
The engineer department, - - - - -	115,942	22
The salaries of officers, - - - - -	41,376	29
Contingent expenses, - - - - -	13,116	93
Lawsuits, fees of counsel, &c. - - - -	13,197	18
The wages of lock-tenders and collectors, a sum chargeable on the annual revenue from tolls, - - -	9,831	72
In the reimbursement of tolls, and payment for damages to boats, - - - - - - -	838	43
In payment of interest on loans, and of discounts on the instalments of stockholders, paid in advance, - - -	3,019	68
Stationery, printing, and postages, - - - -	8,028	08
In the purchase of lands for the western section, and a re-examination, survey, and estimate of the same, as far as Pittsburg, - - - - - -	4,026	08
In payment of a dividend due from the old Potomac Company, but unclaimed till after the transfer of its charter, -	5	55
Being a total expenditure of - - -	3,707,262	43
And leaving unexpended, of the total amount received, viz.	3,927,716	63
A balance of - - - - -	$220,454	20

Which consisted of deposites in bank to the amount of $1,704 20, and of $218,750 vested in Washington and Georgetown Corporation stocks, bearing an interest of six per cent. and payable on the 1st day of July, 1834, being, as above, $220,454 20. Added to which, there remained, on the 1st of January, 1834, to be received:

From the United States, - - - - -	$5,000	00
From the State of Maryland, - - - -	6,250	00
From the Corporation of Shepherdstown, - - -	1,750	00
From the private stockholders, - - - -	261,781	00
And from the Baltimore and Ohio Railroad Company -	88,666	65
Making, in cash on hand, stocks, and sums to be received, the aggregate amount of - - - -	583,901	85
To this amount, the late subscription of the State of Maryland has since added the sum of - -	125,000	00
So that, supposing the balances due from the private stockholders to be available, the aggregate amount applicable to the work remaining to be done on the 1st of January last, was - - - - - -	708,901	85

But from this sum should be deducted, for deaths, removals, and insolvencies, among the private subscribers, occurring in a period of five years and a half, since their

subscription was made, according to official statements - - - -	75,000 00	
Also the debt due the banks, and charged upon the railroad fund, in the account of December 31, 1833 - - - -	55,000 00	
And the further sum of $35,000 supposed by Mr. Fisk, the engineer, to be necessary to complete the graduation of the 4 1/10 miles of railroad, assumed by the compromise - -		35,000 00
Being in all - - - - -		$165,000 00
Which deducted, left to be applied to the unfinished work, and the payments of the several sums retained out of the monthly estimates of the contractors, for work done, until their contracts should be completed, the sum of -		543,901 85
The subsequent reports of Messrs. Purcell and Fisk show that there remained to be expended on the 31st of December last, in order to complete the several works under contract, the following sums :		
For that part of the canal between the head of Harper's Ferry falls and dam No. 4, five miles below the mouth of Opeccon -	51,799 75	
For the part of the line, let in August, 1832, lying between that dam and another erected eight miles above Williamsport -	259,398 96	
For the extension of this portion of the canal, four miles lower down, being from two miles above, to two below the mouth of Opeccon -	103,020 80	
For the towpath to connect this portion of the canal with that below dam No. 4 -	34,950 00	
Making the total amount of the value of the unfinished work to be done on the canal, not in use, on the 1st of January last, the sum of - - - - -		449,169 51
Which, deducted from the fund applicable to this work on that day, leaves a balance of - - - -		$94,732 34

exclusive of the tolls of the first six months of the present year.

This last balance will be applicable to the contingent expenses of the work to be done, and to the payment of the retained money which was to become due, for the work done under contracts not then fulfilled. (Vid. App. D.)

It appears, from this statement, that the work under contract required, for its completion, the entire resources of the company, supposing these resources to be available, after a deduction of $75,000 for bad debts. (Vid. App. E.)

The canal will be navigable, within the present month, or very early in the ensuing, as high up the valley of the Potomac, as dam No. 4, within about ten miles of Hagerstown. By the end of the ensuing autumn, it will be open to dam No. 5, eight miles above Williamsport, and within 2½ miles of Clear Spring, a village west of Hagerstown, on the turnpike leading from Baltimore to Cumberland.

The stock, on which, a dividend may be declared, after deducting from the sums subscribed prior to the 1st of January last, $75,000, the supposed amount of forfeited shares, and adding the 1,250 shares subsequently sub-

scribed by the State of Maryland, will consist of $3,908,400, held in the following proportions :

By the United States	10,000	shares.
By Maryland	6,250	do
By Virginia	2,500	do
By Washington	10,000	do
By Alexandria	2,500	do
By Georgetown	2,500	do
By the Corporation of Shepherdstown	20	do
And by private citizens	5,314	do
Being, as above stated	39,084	shares.

Having presented to the House a detailed statement of the origin of the Chesapeake and Ohio canal, of the various plans proposed for its construction, and the estimates of each, and of the progress, cost, and present condition of the 109 miles of it already completed,* or very nearly so, the committee proceed to compare its present, with its proposed dimensions, and its actual with its estimated cost ; with a view to obviate objections to either, and to infer the probable expense which will attend the completion of its eastern section, from the cost and manner of constructing the part of it already finished.

The plan and cost of the Chesapeake and Ohio canal have both been the subjects of much and repeated misrepresentation. The former has been pronounced magnificent, without use, and the last extravagant and wasteful. It will be seen, in the course of this inquiry, to what extent, either charge, is well or ill founded.

The canal, now in use, below the head of Harper's Ferry falls, sixty-four miles in extent, has for its cross section 306 square feet ; its breadth at the water surface being sixty feet, at bottom forty-two feet, and its depth of water six feet. Its tow-path is twelve feet wide at top, its guard or berm bank on the opposite side, eight feet, and both are raised two feet above the water, and of course eight feet above the bottom, which gives to the inner slope of its banks a rise of one foot in one and a half. The canal is reduced in breadth below those dimensions, whereever much additional expense would have attended a close adherence to them, which was the case for a few miles only. For a much greater distance, where no extra cost attended it, its breadth is enlarged beyond them. In the forty-three miles of canal under contract, or not yet navigable, above Harper's Ferry, its breadth is reduced, as the first annual report proposed, to fifty feet at the surface ; except where its breadth below, could be preserved without extra cost ; or it was cheaper to extend it even beyond sixty feet, as has been the case for several miles of that distance. Its depth, throughout, is never less than six feet ; though in some places it exceeds it, and for near a mile, it varies from six to forty feet, as at the Bear island pond.

Its lift locks of cut freestone, limestone, or granite, 45 in number, average eight feet lift, and are one hundred feet by fifteen in the chamber, being designed for one hundred ton boats, to be drawn, each, by two horses, attended by two men and a boy. Its guard locks, four in number, are of the same species of stone, with hammered faces. Its aqueducts, five in number, one of cut freestone, one of cut granite or gneiss, and three of rock work ; two of them have their faces of limestone blocks, the beds and joints of which are cut, and the outward border of each stone for one inch from the joint : the face of the sheeting is also cut. The culverts, are in number

* The water has been admitted into it, from dam No. 4, since this report was made.

136, of which many are enlarged to a breadth of ten feet and upwards. Their length is such, as allows to the canal, every where, its full breadth: and they are of the same materials with the aqueducts; the ring stones of their arches are cut, the rest of the stone hammered, but not ranged. The locks, aqueducts, and culverts are laid in hydraulic lime, of approved quality, mixed with pure sand, in equal proportions; except in rare cases, where the oxyde of manganese, or an artificial composition of iron filings and common lime, has supplied the place of the natural hydrate of lime.

A small quantity of Parker's Roman cement has also been used, for experiment; but being found expensive, and that its place could be securely supplied by the native hydrate of lime, its consumption was stopped.

In place of permanent bridges, for preserving a communication across the canal, an amendment of the charter allows the substitution of aqueducts beneath, or ferries over it; and where neither would be practicable or convenient, the use of pivot bridges; which being erected, at little cost, across the locks, they are, for that reason, located, where it could be done without extra expense, in the public roads leading to ferries. But one permanent bridge, the string pieces of which are elevated thirteen feet above the water, has been erected across the canal, above the upper boundary of Georgetown; and in that, it is designed to provide hereafter a draw, for the passage of steam or sail boats.

To save the waste and cost of lands, to avoid the charge for extra fencing, and obviate the necessity of frequent passways over, or under the canal, its location has been conducted, as near the river as practicable with safety to its embankments and other works; and in some cases, with a view to economy, small slips of land lying between the canal and the river bank, have been purchased of the proprietor.

Its towpath, above Georgetown, is always on its river side; and wherever that is in danger of abrasion by the current, it is carefully protected by substantial slope walls, constructed generally of stone selected from the excavation.

The best of the smaller stone are used for an inner lining of the canal, which already extends through many miles of it; and when time shall allow for the transportation of the superabundant stone, to where it is needed, this improvement will pervade the whole line of navigation, so as to save, in a great degree, the necessity of future repairs; and to fit it, as originally intended, for the application of steam, as its moving power, without injury to the inner slope of its banks.

Such is the plan of this great work. The manner in which it has been executed will be best understood, by referring to two very critical and careful examinations of it, made by skilful engineers of the topographical corps of the army, by order of the President of the United States, at the request of the president and directors. The first was conducted by two officers of high rank, Colonel John J. Abert and Colonel James Kearney, in June, 1831. A copy of their report, bearing date the 14th of that month, will be found in the appendix to this report. (Vid. B.) After a very minute description of all the works then completed, or in progress, between the Rock creek basin, in Georgetown, and "The Point of Rocks," their report closes with this strong testimony in favor of the manner of their execution. "We are fully aware," say Colonels Abert and Kearney, "that, after all we have said, we have not yet given an adequate idea of the great and interesting work we have been directed to examine. The difficulties

which have been surmounted, the quantity of labor it has received, the vast amount of rock excavation, the extent and excellence of the walls of dry masonry, the durable aspect of all the structures, the great and imposing dimensions of the canal, the judicious adaptation of the excavations to the fillings and embankments, can be duly appreciated only by visiting the work. The trade of the canal on the part now in use," they add, "is very active."

Speaking, in an earlier part of their report, of one of the distinguishing features of this canal, these engineers remark, that "one mile from the *roadway*, at Hillary's farm, another arched roadway is in progress. The work is completed to the height of the abutments, and is a fine specimen of masonry. The passway between these abutments is ten feet wide. Three-quarters of a mile further, a pit is excavated, and part of the foundation laid for another roadway intended for the convenience of Conrad's ferry. We cannot here *forbear expressing our decided approbation* of this method of passing canal lines, over the more usual method by bridges. Its many conveniences to those who use these roadways, as well as to the canal, should, in all cases, give to them a preference, where the ground is adapted to their construction." "The usual time," they remark in another part of their report, "employed in the passing of a lock, by the packet boat, is *four minutes*. A passage, however, may be readily effected in *three minutes and a half*, and we were informed that, in an experiment of several passages, the average of the time occupied was *but three minutes*."

The second examination of the canal by the authority of the Executive, was confided to Captain William Gibbs McNeill, also of the corps of topographical engineers, who, to the scientific knowledge, belonging to his profession, as a *military engineer*, adds the fruit of an experience enlarged by several years' employment in civil engineering; for which, the better to promote his usefulness, he visited, with the permission of the Executive, the canals as well as railroads of England, the country most distinguished for both these species of internal improvement. His inspection of this canal, in June, 1833, comprehended the entire line, completed, or under contract, from the mouth of the Tiber to the dam eight miles above Williamsport; and extended not only to the *structure* of all its works, but an elaborate investigation of their respective cost; and an examination of the records and the condition of the offices of the clerk and resident engineers of the company. That he had every facility which he could desire, in the discharge of his duty, afforded him by the officers and engineers of the company, is manifest from his report, which closes in the following terms: "A disposition was manifested by all, to invite the strictest scrutiny, not only of the manner in which the work had been executed, but also of its cost;" and he adds, "I may not withhold my willing testimony to the highly creditable arrangement of the archives of the company, which, from an examination, whether at their office in Washington, or the two residencies at Harper's Ferry and Williamsport, is such, as to admit of the *most ready reference*, and to provide for the most *satisfactory accountability* for the various disbursements of the company."

Of the plan of the work, he gives this description: "As it respects the cross section, or dimensions of the canal, its general breadth, below the abutment of Harper's Ferry bridge, is 60 feet, at the surface, with a depth of *six* feet: while, above the abutment, (the depth remaining the same,) the breadth is diminished to 50 feet. In both cases, however, there are excep-

tions to these general dimensions: as, for instance, between Georgetown and the Little Falls, a distance of five miles, the canal has, in general, a width of *eighty feet*, with a depth of *seven feet*. In other situations, as between the Point of Rocks and Harper's Ferry, we find that, in a distance of twelve miles, the width of the canal varies, for three and one-fifth miles, from seventy to eighty, and even one hundred feet; but it is to be remarked, that the advantages of this increased width, were here attained *without additional cost*, and, indeed, from the nature of the ground, *at less* expense, than if the regular width of sixty feet, adopted for this portion of the canal, had been adhered to.

"For like reasons, that is, because of greater economy of construction, above Harper's Ferry, in a distance of forty miles, it has been found expedient to deviate from the regular width of fifty feet for five and a half miles." "In contemplation of these dimensions, or rather of those more generally adopted for the cross section of this canal, we are led to remark, that (however expedient it may have been to reduce the width above Harper's Ferry, in order that, by husbanding their resources, the company might, with great certainty, reap the expected fruit of their enterprise, when the canal shall have reached the vicinity of the exhaustless coal mines of the Alleghany mountain) a consideration of the superior advantages of the more enlarged dimensions, at least, justifies, in my opinion, the expectation that a full equivalent for the increased cost attendant on them will hereafter have been realized.

"They have obtained, it will be recollected, on a portion of the canal, which will not only concentrate almost the whole trade to be derived from successive contributions, in its progress from Cumberland, if not from Pittsburg, towards Georgetown, but on a portion, to which will be confined the important accession to the general trade of the canal, in the transportation of the varied products of the fertile and extended valley of the Shenandoah. An additional motive may also be found, to compensate for increased cost of construction, in the greater effect of the moving power, (see calculations on this subject, based on the experiments of D'Alembert, Condorcet, Bossuet, and Dubuat, in the report of the United States Board of Internal Improvement, made in 1826,) and the consequent reduction in the expense of transportation, which, when it is recollected that this portion of the canal must compete with the Baltimore and Ohio railroad, is not the less calculated to make the canal productive. (Vid. App. F.)

"Similar reasons do not obtain, to the same extent, in recommendation of the like dimensions beyond Harper's Ferry; and it is, therefore, in harmony with the principles which govern both the plan and execution of this work, that, above this point, we find its greatest width diminished. I would respectfully submit, however, the opinion, which I entertain, that, in the further prosecution of this canal, considerations of cost of construction would have an undue influence, and the utility of the work be impaired, if, *at least, the dimensions adopted, although not preferred, by the United States Board of Internal Improvement*, be not preserved."

In commenting on that feature of this canal which distinguishes it from the canals of America, and regarding its present length and expected extension, from all other canals in the world, Captain McNeill says: "At the Point of Rocks there was under construction, and nearly finished, one of these pivot bridges, which, wherever bridges have been thought necessary, from the intersection of the canal with a public road, have been substituted for the permanent bridges which constitute such a source of annoyance

on canals generally." "Permanent bridges having been entirely dispensed with above Georgetown, unless the high wooden bridge opposite the falls be an exception," "there will be no obstruction to the safe and comfortable transportation of passengers on the canal with such celerity as, amid all the improvements of the age, it shall be found practicable and expedient to attain." The bridge at the falls, the committee are apprised, is not to remain an exception, it being intended to insert in it a draw.

In speaking of the "character and condition of such portion of the canal as had either been completed or placed under contract; which, computing from the basin in Georgetown, where" his "examination began, ascends the valley of the Potomac upwards of 107 miles, or to the" river "lock next to dam No. 5, above the town of Williamsport," Captain McNeill says: "Of this portion, every part of the work may be said to have been entirely completed to the Point of Rocks, 48 miles from the basin at Georgetown, (in June, 1833,) and, with very unimportant exceptions, where the discovery of slight imperfections has already led to their repair, exhibited *all the faithfulness of execution which ensures stability.*" He adds, "the reports of Colonels Abert and Kearney, who preceded me on a similar examination in 1831, so minutely described this section of the canal, that a very general summary will suffice to exhibit the facts which I would bring in review on this occasion. In the words of the late President of the company, (see third annual report, page 13,) it may emphatically be remarked that 'on no canal in America, and very few, if any, in the world, will there be found, and certainly on no part of the Chesapeake and Ohio canal do there remain to be encountered, obstacles more appalling than have been overcome.'

"True it is, that he refers more especially to that particular section which embraces the descent between the Great and Little Falls of the Potomac; 'a compass of eleven miles along precipices, bounding a river which has borne on its bosom ice and snow elevated for several miles 30 feet above its ordinary height.' Yet the numerous locks and culverts, the extent of rock excavation, and of outer walling which has been found necessary to the support and protection of the towpath, two expensive aqueducts, &c., constitute difficulties characterizing the whole section under consideration, which, from description alone, can scarcely be appreciated."

Captain McNeill's report affords the following summary of the "total quantity of excavation and embankment," with their cost "in their several varieties, in order to form the trunk of the canal, from the Rock creek basin, at Georgetown, to the Point of Rocks.

			Av. per yd.	Common av.
Grubbing,	- - -	12,892		
1,893,666 cubic yds.	common excavation,	190,917 -	cts. 10	$12\frac{62}{100}$
439,071 do.	hard pan,	103,412 -	$23\frac{55}{100}$	
75,472 do.	quarry rock,	23,761 -	$31\frac{48}{100}$	$67\frac{46}{100}$
398,524 do.	rock blasted	295,996 -	$74\frac{27}{100}$	
571,121 do.	embank. from canal,	75,284 -	-	$13\frac{18}{100}$
962,729 do.	do. *not* fr. canal,	185,749 -	-	$19\frac{29}{100}$
97,092 do.	puddling,	25,107 -	-	$25\frac{86}{100}$
215,701 perches of walling, of stone paid for as excavation,		116,407 -	perch	$53\frac{97}{100}$
15,363 perches not paid for as excav'n		15,528 -	-	$1 $01\frac{7}{100}$
Extras* - - -		40,800		
Total -		$1,085,853"		

* The extras consist of the houses of lock tenders, inner pavement, waste weirs, &c. &c.

Captain McNeill next proceeds to consider the condition of the work above "the Point of Rocks." "This, which, as has been stated," he says, "extends for a distance of 107 miles from Georgetown, had already so far progressed, that the expectation might be confidently entertained that by the opening of the coming spring" (that of 1834) "it will have also been entirely completed." Indeed, the interval between the Point of Rocks and the head of Harper's Ferry falls, a distance of 14 miles, it was supposed would at all events be finished (as it is believed it has been) by the 1st of September past, and that, during the current year, the use of the canal would be secured as far as Shepherdstown, 72½ miles from the basin at Georgetown.

"These expectations were thought by me to be well founded, and in accordance with the statements furnished me of the work done, compared with that remaining to be done, confirmed by my own observations, at the time alluded to," (between the 4th and 10th of June, 1833.)

"The formation of the canal, including the excavation, embankment, and necessary walling, was on the 1st of May more than half completed. The seven locks between the Point of Rocks and Harper's Ferry were so nearly finished at the time of inspection, that it was estimated that the sum of $2,000 would suffice to complete them; and of the remaining ten locks then in progress, about one-third of the work had already been completed." The report then supplies the following comparative statement of the progress which had been made in the formation of the canal above the Point of Rocks.

"*Work done.*

Grubbing - - - -		$7,151	19		cents.
1,516,016	cubic yards excavation of earth,	182,614	49,	av. p. yd.	12 5/100
253,994	do do rock,	168,348	70,		66 29/100
262,189	do embank. from canal,	28,567	60,		10 90/100
394,228	do do. *not* from canal,	92,727	56,		23 52/100
10,167	do puddling - -	1,776	00,		17 47/100
103,139	perches of wall, constructed of stone out of the excavation -	46,950	99,	perch	45 52/100
3,482	perches of wall, constructed of stone, not paid for as excavation	3,208	00,		92 13/100
Extras - - - - -		2,428	13		
		$533,772	66		

"*Work to be done.*

Grubbing - - - -		$2,501	81		
1,157,889	cubic yards excavation of earth,	133,532	81,	av. p. yd.	11 53/100
179,758	do do rock,	110,897	95,		61 69/100
8,150	do do slate,	1,841	00,		22 59/100
184,569	do embank. from canal,	20,530	63,		11 12/100
509,163	do do *not* from do	103,733	78,		20 37/100
27,450	do puddling - -	3,390	75,		12 35/100
68,168	perches of wall of stone out of excavation - - -	32,822	02,	perch	48 15/100
6,240	perches of wall of stone, *not* out of excavation - -	5,794	00,		92 85/100
Extras - - - -		6,136	00		
		$421,180	21		

"All earth paid for as excavation, and *hauled more than* 120 *feet*, is considered as embankment from canal, in contradistinction to that obtained from the outside of canal; and, in like manner, there is a division of the wall into walling from stone which comes out of the excavation of the canal, and that which does not.

"As it has been stated, that below the Point of Rocks, massive walls were often unavoidable for the support and protection of the canal, so above the Point, do the numerous cliffs which impinge upon the stream, frequently necessitate a location fruitful in like sources of expense. And as some diversity of opinion seems at one time to have prevailed, respecting the *particular* location around the Point of Rocks, or between that spot and Harper's Ferry, my attention was naturally directed to the subject, and it has resulted in the opinion, that whether a canal or railroad had been the object *singly*, the engineer, in consulting the interests of either, could scarcely have found a reason for preferring a greater exposure of the work, than that which was irremediable, if he would avoid, (as he has done in the location of the canal,) an undue quantity of rock excavation. Of the extent to which the canal, under the advantages acquired by priority of construction, is notwithstanding washed by the river, or in the occupancy often of a portion of its bed, it will suffice to state, that walling has been necessary, to its protection, for about ten miles of the distance now under contract, above the Point of Rocks. On this portion, we find also, that the paving of the inner slope of the towing path has continued to be judiciously persevered in, whenever a surplus of rock excavation would afford the materials, as was found to be the case, for seven miles and nine-tenths, or more than half the entire distance, between the Point of Rocks and Harper's Ferry falls. From this last named locality upwards, we have not the means of estimating, with precision, the extent to which the inner paving will be continued, as it is the last operation incident to the completion of the canal."

After a particular description of each work on the canal, not minutely described in the long antecedent report of Messrs. Abert and Kearney, Captain McNeill expresses the hope "that the foregoing statements will have furnished, with sufficient minuteness, such details as" he had "been enabled to collect, as well from observation as from a careful examination of the archives of the company, illustrative of the *cost*, *character*, and *condition* of the work. Such," he adds, "as relate to the formation of the canal are recapitulated in the following summary, exhibiting the total amount of the embankment *done* and to be done, at the date of the inspection, on the whole canal completed and under contract, *above its* entrance into the Rock creek basin, exclusive of the additional quantities and cost resulting from the transfer of locks Nos. 41 and 42, as previously stated, four miles lower down the river, viz.

Grubbing, - - - -		$22,545	00		
5,006,642 cub. yds. of earth - -		610,475	76, av.	per yd.	12 19/100
907,698 do rock - -		599,003	65,	do	65 99/100
8,150 do slate - -		1,841	00,	do	22 59/100
1,017,809 do emb'kt from canal		124,582	23,	do	12 22/100
1,866,120 do em. not from canal		382,210	34,	do	20 48/100
134,709 do puddling -		30,273	75,		
387,008 perches of stone p'd for as excav.		196,180	01,	do perch	50 69/100
25,085 perches *not* p'd for as excavation		24,530	00,	do	97 79/100
Extras - - - -		49,364	13		
		$2,040,805	87		

"Of the above amount, the value of the work done of the above description, on the 1st May, was $1,619,625 65; and of that then remaining to be done, $421,180 22; (or, allowing for the transfer of locks 41 and 42, say $521,180;) and the average prices of the whole work, '*done and to be done,*' will be as follows, to wit:

Cut stone, locks, including foundations and gates, per foot lift,	$1,156 00	
Excavation of earth, per yard,		12 19/100 cts.
Do. rock do		65 99/100
Do. slate do		22 59/100
Embankment from canal, per cubic yard,		12 22/100
Do. not do. do.		20 48/100
Walling of stone, paid for as excavation, per perch		50 69/100
Do. not paid as above,		97 79/100

"A review of all the circumstances justifies, in my opinion, the conclusion that, considering the nature and character of the work, prosecuted, as it has frequently been, amid all the disadvantages of sickness, of locality, and consequent interruptions, during the most important season of the year, the above prices can seldom have yielded more than the fair equivalent which is due to the enterprise and industry of the contractor."

The committee have sought, by these copious extracts from the reports of the United States engineers, to place before the House of Representatives, detached from minute and technical criticisms on the various works of the canal, the decisive testimony of these very competent, and, in all respects, disinterested and impartial judges of the *plan*, the *execution*, the *cost*, and *condition* of a great national work, towards the construction of which Congress have authorized the subscription of a million of dollars, and to which, they are invited, by numerous memorials, to afford further pecuniary aid. It may be proper to add, that two of those engineers, Colonel Abert and Captain McNeill, very largely contributed to the original survey of this canal, under the United States Board of Internal Improvement. In contrasting its *actual* with its *estimated* cost, it will next be shown, that while, in its construction, it bears a favorable comparison with any other similar work in America or in Europe, its cost, so far as it has proceeded, falls as far below the prior estimate of that Board, as it surpasses that of the two civil engineers, Messrs. Geddes and Roberts. In truth, the plan of the canal which has been constructed differs *essentially*, in its dimensions, from any, for which an estimate had been made, before its construction commenced. In this view, its cost sinks yet further, below the estimate of the United States Board of Internal Improvement. For sixty-four miles, it maintains, with scarcely a reduction any where, on account of peculiar obstacles, a greater breadth at the surface by twelve feet, and, for forty-two miles above, a greater breadth by two feet; it is throughout deeper by one foot, and its towpath and guard banks are broader at top by three feet than the corresponding dimensions of that canal, the eastern section of which the United States Board of Internal Improvement computed at $8,177,081 05; or, at a sum exceeding nine millions, if there be added the usual allowance for contingencies, and a reasonable estimate for land and water rights; for the exclusive instead of a very limited use of water lime, in very nearly all the masonry of the aqueducts, locks, and culverts; and the substitution of cut stone, for hammered faces, in the far greater part of the masonry of the locks.

It can scarcely be necessary to remark, that although, in certain situations, a broad, and, in others, a deep canal, and, under very peculiar circumstances, a canal both deep and broad, may be constructed at as little, or even less cost, than one of smaller dimensions; yet, on any line of great extent, the cost of a canal will be greatly augmented if its enlarged dimensions be maintained throughout, or very nearly so, as in the case of the eastern section of this canal. (Vid. App. G.)

Messrs. Geddes and Roberts estimated the cost of a canal between Georgetown and Cumberland, which should have the breadth and depth of the State canals of New York and Ohio, the cross section of which below their water line is but 136 square feet; their water surface being forty feet wide, their bottom twenty-eight feet, and their depth but four feet, at $4,008,005 28. But, in this estimate, they allow nothing for land and water rights, nor for the houses of lock-keepers and collectors, nor for the various locks which connect the canal and river, to favor the commerce of the Virginia shore. The trunks of their aqueducts are supposed to be of wood, their locks to be less in height by two feet, and in length by ten feet, and their culverts, more than two hundred in number, shorter, by twenty-six feet each, than those of the Chesapeake and Ohio canal. It is true, they include 158 bridges, which are dispensed with in the plan of this canal; but they compute their cost at but $200, where designed for public roads, and $150 for private, if a due allowance be made for those omissions and for those minor differences in the plans of the work estimated by those engineers, and of the work done, to say nothing of the superior size of the latter, their estimate should be enlarged by a sum not short of $600,000, *in any fair comparison of it, with the actual cost of the present canal:* the land condemnations and purchases for the 109 miles, now nearly completed, having cost (and the account is not yet closed) more than $171,400; the locks, averaging eight feet lift, and forty-five in number, $1,156 the foot lift, instead of $800, their estimated price; and the five aqueducts of stone arches on the same line the sum of $180,808 05 more than those estimates allow for their construction, with *wooden* trunks.

But another cause has, in a manner yet more obvious, swelled the actual cost of this canal beyond the estimate of those eminent civil engineers: the extension of the canal in length (vid. App. E.) from the upper boundary of Georgetown to the mouth of Tiber creek, in Washington, a work which, though not comprehended in their prior estimate, has cost not less than $350,000, exclusive of the purchase and condemnation of lands and lots, amounting to $65,000 more. Add to all those differences *in plan, construction, and extent*, between the work *executed*, and that *estimated* by Messrs. Geddes and Roberts, an adequate allowance for the enlarged dimensions of a canal, the cross section of whose trunk or water prism exceeds, by thirty-four square feet, the double of the cross section of their smallest canal, and their estimates will be found to correspond very nearly with the real cost of the Chesapeake and Ohio canal, though the eastern section of it be supposed to cost six millions. In allowing for the enlargement of the breadth of the estimated canal, for 126 out of 186 miles, from 40 feet, to 48, and 60 feet at the surface, and for the increase of its depth from 4 to 6 feet, those engineers undervalued the difference in the quantity and character of the additional labor to be exerted in their construction.

The contractors who first entered upon the Chesapeake and Ohio canal, undertook their work at prices very little, if at all, higher than those, which they had found to yield an adequate compensation, for similar labor, on the narrower and shallower canals of New York, Pennsylvania, and Ohio. The consequence was the ruin of several; though the far greater part of them, either very soon abandoned their contracts, or petitioned for, and obtained higher prices. Additional allowances were granted them until the inconvenience of changing the terms of the original contracts; and, above all, the danger to which it subjected the company, of imposition and fraud, induced the establishment of the rule, afterwards rigidly enforced, that no contractor should, under any circumstances, be allowed for his work more than the stipulated price. The effect of this precaution was, of necessity, to augment those prices in all the new contracts. (Vid. App. I.) Where the water prism of a canal is sunk in nearly level ground, so deep, that its water surface is even with the natural surface of the adjacent earth, every additional cubic yard of excavation required for the enlargement of the dimensions of the canal, must be carried so much farther, or lifted so much higher. Where this enlargement requires a canal to be *two feet deeper* and *twenty feet broader*, the *average price* allowed for the excavation of the smaller canal will furnish a very inadequate compensation for the extra quantity of materials of earth or rock to be removed from the larger; and yet more incompetent will be this average, provided the extra quantity be removed exclusively to one side of the canal; as is required, on this canal, with the view, in some places, to strengthen its defence from the current of the river, and, in all, to keep unobstructed, the access to the canal from the neighboring country, and to avoid, where practicable, disfiguring by spoil banks, or injuring, in any way, the adjacent lands.

It should also be borne in mind, in accounting for the excess of the cost of this canal, beyond even the highest estimate of Messrs. Geddes and Roberts, that, as far as the first twenty miles, its depth was extended from five to six feet water, after the contracts had been formed for its construction, and its levels had been adjusted to the depth first contemplated; a measure which, however urgently recommended, by considerations of public economy, could not fail to enhance the cost of the various works. Besides its unavoidable effect in augmenting the quantity of masonry, by adding a foot to the depth of each lock chamber, and to the height of the parapet walls of each aqueduct, it required, in some cases, not only the pits, but the abutments of the culverts, to be sunk a foot deeper, to clear a passage for water, beneath the canal, sufficient to vent it. Moreover, the long level below the last access to the river, at the head of the Little Falls, underwent a still greater enlargement after that estimate had been made, in compliance with the express condition of the subscription authorized by Congress, which had for its object, besides furnishing water if needed, for canals, to the navy yard, Alexandria, and Annapolis, to allay the inquietude of Baltimore, lest an adequate supply of water, at the required elevation in Georgetown, (vid. App. K.) should not be furnished to the "Maryland canal." For the construction of the last named work, a charter had been granted, with a liberal subscription of stock, by the General Assembly of that State, with whom it was once a favorite project.

But if the canal which has now been in part constructed on a highly improved plan, shall be ultimately found, for that reason, to exceed, in cost, the estimate of the largest of the three canals described in the report of Messrs. Geddes and Roberts, it will appear, without any allowance for its superior dimensions, and its substantial and faithful execution that its cost falls far below, and with such allowance, at least $3,000.000, or 33⅓ per cent. short of the estimate of the United States Board of Internal Improvement.

It is now ascertained that the cost of the first 109 miles of the Chesapeake and Ohio canal, will reach $3,760,000, (vid. App. E and H,) exclusive of the exorbitant sums allowed by juries, to the proprietors of land and water rights, occupied or destroyed by the canal; of the cost of that incessant litigation, by which the company has been harassed; and of the usual allowance on all such works, for those contingencies, which comprehend printing, advertising, postages, and the much heavier items of salaries or compensation to officers, engineers, and other agents, along with the rent of offices and furniture, instruments, &c. &c.; for which, ten per cent. is usually added to the estimated cost of a canal; an allowance seldom found to exceed, very far, the actual expenditure. As none of those items are embraced in the estimate made by the Board of Internal Improvement, so they are also excluded, from the comparison which is here instituted between their estimates and the actual cost, so far as it has proceeded, and the probable cost estimated by that standard, of what remains to be done, of the eastern section of the canal.

But there should be added to their estimate, the sum actually expended in extending that section two miles below their proposed termination of it, being the distance from the market-house in Georgetown, to the mouth of Tiber creek, in Washington, (vid. App. E,) and the extra cost attending the enlargement, beyond the narrowest dimensions which they at first contemplated, of that portion of the canal upon the Georgetown level, which is for a part of that level, in breadth, 70 feet; for a greater distance, 80 feet; and never less, even in the deep cut through the town, than 42 feet; and which, moreover, involved the construction of an extensive mole, including a tide lock, in very deep water; and the formation of a basin of eight acres, designed to serve as a harbor for the canal boats, while delivering or receiving their cargoes, at the end or the commencement of their voyage. This single item, however necessary, exceeds in cost, their estimate for a basin, by more than $60,000, as does the entire additional expenditure five times that amount, after all reasonable deductions. To the sum of $3,560,000, thus added to the actual, beyond the estimated cost of this section, by the extension of its works to a lower termination, should be also added, as in the comparison instituted with the subsequent estimate of Messrs. Geddes and Roberts, a due allowance for the extension of the breadth of the canal above the Little Falls feeder, from 48 to 60 feet, at the surface; of its depth, from five to six feet; of the surface of its towpath, from nine to twelve; and its guard banks, from five to eight feet; in relation to which, it is deemed unnecessary to repeat the remarks already applied to the estimate of Messrs. Geddes and Roberts. It is confidently believed, however, that after deducting the sums allowed for fencing and bridges in the prior estimate of the United States Board of Internal Improvement, the addition of at least three-fourths of a million of dollars to their estimate, would be required, to establish a just comparison between that estimate,

and the actual cost of the Chesapeake and Ohio canal. If this addition be made, the excess of the estimated above the actual cost of the eastern section of the canal, without any allowance for land condemnations or contingencies, will extend to very near or quite the sum of three millions of dollars."

Whatever, in actual cost, the canal may appear to have saved, from the substitution of ferries, pivot bridges, and viaducts beneath it, for the very numerous and inconvenient permanent bridges, 79 of which are comprehended in the estimate of the Board, at but $28,700 cost, has been more than counterbalanced, by the actual price of the substitutes for them already described; the economy of which results from the superior accommodation that they afford to the neighboring proprietor, and the public, as well as to the passenger on the canal; and from the absence of the necessity of future repairs or the entire renewal of its most perishable appurtenances.

The cost of *extra fencing*, extending in the estimates to 175 miles, and computed at $157,500, has been paid, on the purchase or condemnation of the lands taken for the canal, to the proprietor, who is bound for its future repairs. It is with a due consideration of these and other circumstances, that the above balance is struck, between the estimated, and the actual cost of the eastern section of the Chesapeake and Ohio canal.

If any doubt, therefore, shall remain of the accuracy of this comparison, and its declared result, it must attach to the expected cost of the part of this section of the canal not yet placed under contract.

For the cost of the 26½ miles of it, however, lying below the mouth of the Big Cacapon river, a standard has been very recently furnished by a survey, location, and *working* estimate, preparatory to contracting for its construction.

This standard is supplied by a competent resident engineer, assisted by an experience of five years, on the part of the canal already completed; and is entitled to the fullest confidence.

Mr. Cruger's estimate (vid. App. L) embraces the usual allowance for contingencies, and computes the cost of these 26½ miles at $25,000 per mile. Applying the same standard to the 53½ miles which will remain to be constructed, above Cacapon, in order to reach Cumberland, the cost of the part of the canal not yet placed under contract will be $2,000,000; which, added to the actual cost of the part below, will extend the entire cost of the eastern section to $6,000,000. This result is attained after a due allowance for all extra or contingent expenses: some of which, the experience of five years, and the increasing favor of the public, towards an enterprise which has, now, no enemies, will enable the President and Directors greatly to reduce. Such will, undoubtedly, be the result, in relation to the expense of the engineer department, of lawsuits, of printing, and, it is to be hoped, if not confidently expected, of land condemnations; since the benefits to be derived from the canal, which the juries are required by the charter to compute, in assessing the damages of each proprietor, must be much *more apparent*, as the canal is brought into active use, and extended to a country very remote from market.

But if, after all the facts here stated, and the reasoning already adduced, there shall exist, in the most prejudiced mind, the least doubt of the economy of the actual, contrasted with the estimated cost of this canal, by the United States Board of Internal Improvement, which was once so near

arresting its progress, and may yet discourage its friends, the following undeniable evidence is offered.

It is drawn from a laborious and careful comparison of the quantities and cost of the various species of work computed by them, in the several subdivisions of their canal, between a point eight miles above Williamsport, and the lower end of their tenth subdivision, ending at the old locks of the Potomac Company, near Georgetown, with the ascertained quantity and cost of the same species of work in the canal now constructed.

In the distance of 103 miles, the number of cubic yards of excavation and embankment, and of perches of dry masonry, on the two canals, is found to be as follows:

	In the estimate of the Board of Engineers.			*In the canal nearly constructed.*		
	Cubic yards.		Cost in dollars.	Cubic yards.		Cost in dollars.
Of excavation,	5,885,814	at	1,429,651 94	5,922,490	at	1,211,300 41
Of embankment,	1,723,816	at	441,207 00	3,028,708	at	536,866 32
Perches of dry walling	527,456	at	1,575,920 00	412,093	at	220,710 01

So that, while the quantity of excavation, on the larger canal, exceeds that on the smaller, by 36,676 cubic yards, the cost of this item in the former falls short of its estimated cost in the latter by $218,331 53.

Although the quantity of embankment, on the larger canal, exceeds by 1,304,892 cubic yards, or three-sevenths, being more than 40 per cent. that on the smaller canal, the difference in the aggregate cost of this work, on the two canals, is but little more than 20 per cent.

The average cost of excavating every sort of earth and rock, on the 48 feet canal, is computed at $24\frac{45}{100}$ cents per cubic yard; while the actual average price of the same work, on the broader and deeper canal, averages but $20\frac{4}{5}$ cents per cubic yard.

The estimate of the cost of the embankment on the former will be found to average $25\frac{51}{100}$ cents per cubic yard; its cost, on the latter, is but $17\frac{72}{100}$ cents per cubic yard: the two proportions being nearly as 4 to 5 and 2 to 3, in favor of the larger canal; and this, too, in relation to the most common items of expense, occurring in the construction of every canal. If those proportions be compounded, the relative cost of the cubic yard of excavation and embankment on the smaller and larger canals, will be as $19\frac{53}{100}$ cents to $24\frac{58}{100}$, or near 4 to 5, in favor of the broader and deeper canal.

A much more favorable proportion than this, for the 60 feet canal, will be found to pervade the estimated and actual cost of the dry masonry of the two canals; the estimated average price of walling on the 48 foot canal, is $2 98 per perch; the actual price per perch, of the walls of the 60 foot canal, exclusive of inside paving, is $53\frac{56}{100}$ cents, affording a ratio of near $5\frac{1}{2}$ to 1; and an aggregate difference in favor of the 103 miles of canal, to which this ratio applies, of $1,355,210 99.

In the masonry constructed with hydraulic cement a like disparity exists, though to a much less extent, in favor of the actual canal.

Supposing the substitution of *cut* for *hammered face stone* in the ashlar of all the lift locks, the exclusive use in practice, for the very limited *estimated use* of water lime in their cement, and the addition of one foot to the breadth and depth of each lock, to counterbalance the difference in the plan of their foundations, where those are not sunk, as in many cases they have been, deep in solid rock, and the reduction of the length of their chamber from 102 to 100 feet, the estimated, compared with the true cost of 45

lift locks, is as 1,500 dollars to 1,156, making a difference of cost, in this item singly, of 123,840 dollars.

If a similar difference does not exist in favor of the work done, and that estimated, in relation to the culverts, it results from the greater length, breadth, and height given to those upon the constructed canal, than in the estimates for the smaller, in order to adapt them to a canal of greater breadth with thicker banks, and to fit many of them to be used as substitutes for permanent bridges or ferries.

The five aqueducts on the larger canal have cost $249,400. The estimate of them, by the Board of Internal Improvement, was $275,827. The most costly masonry on the whole line of 103 miles is that of the Monocacy aqueduct, a work not surpassed, in strength or appearance, by any in America. Its cost, per perch, is less than its computed cost, though its aggregate much exceeds its estimated cost. The estimate of the board of engineers allows $99,000 dollars for an aqueduct across the Monocacy, 120 yards long, consisting of 8 arches, each of 30 feet span. The aqueduct, now erected, consists of seven arches, of 54 feet span each. It is 540 feet long, and its length is not found to be too great, for the river whose breadth it subtends.

Having, as they trust, sustained the proposition, that the actual cost of the Chesapeake and Ohio canal has fallen very far short of that particular estimate which they have last reviewed, the committee, in justice to the able authors of both the preceding estimates, admit the difficulty of instituting and sustaining a correct comparison, between the first estimates, however minute they may be, as in the present case, and the actual cost of any canal. That the computed, usually turns out to be less than the actual cost of all such works, is universally known; and for that, among other reasons, the economical construction of this particular canal cannot be questioned.

It is due to the late Board of Internal Improvement, whose zealous labor contributed so essentially, to further the success of this great enterprise when it much needed public favor, to remark, that no two engineers, in separately estimating the same work, were ever found to agree in their prices; that successive examinations lead, often, to great improvements in the most important office of an engineer, the judicious location of a canal; and the quality of the work contemplated, in any previous estimate, may, and very often does differ, most essentially, from that of the work executed.

Messrs. Geddes and Roberts computed the cost of the five aqueducts last mentioned, at but $58,600, which is less than a moiety of the actual cost of one of them; and in the final location of the Chesapeake and Ohio canal, through a space not exceeding ten miles, a sum not less in amount, than $200,000, was saved by transferring the line of canal, from the base of the river cliffs, to a level fifty feet above, on the high and comparatively smooth surface stretching back from their summit.

The probability that the residue, about seventy-eight miles of the eastern section of this canal, can be completed for $25,000 a mile, has been rested, in an earlier part of this report, upon the working estimate, which accompanied the late definite location of a line of twenty-six and a half miles of it prepared for construction. It will be confirmed, by referring to the annexed tabular statements of the actual cost of the last forty miles placed under contract above Harper's Ferry. This part of the line will have been finished under many disadvantages, for about the price

before mentioned; although it comprises two elevated dams, at a tenth, and the masonry alone of its locks, aqueducts, and culverts, exclusive of its dry walls, makes up a third of the remaining nine-tenths of its total cost. Among its sections, also, are to be found, notwithstanding its reduced breadth, some of the most expensive on the whole line of one hundred and six miles, having their foundations in deep water, and passing along the face of perpendicular cliffs of solid rock, with embankments formed of earth brought, of necessity, from the opposite shore of the river, over temporary bridges.

Experience having now shown that, except in very peculiar situations, external walling may be safely dispensed with, where a sufficient quantity of loose stone is furnished, from the excavation, to supply an effectual cover to the exterior bank of the canal, this item of expense, which, on the eastern section alone, was, by the United States Board of Internal Improvement, computed at $2,737,808, and on the entire canal, at as much as $6,634,975, will rarely, it is presumed, occur hereafter.

All these considerations co-operate with the reduction of the canal to a breadth of fifty feet at the surface, to induce a very confident belief, that preserving, in all other respects, its enlarged dimensions, and substantial and durable structure, the residue of the eastern section may be completed for two millions of dollars; a moiety of which sum, it has been proposed that the United States shall subscribe; the Legislature of Maryland being expected, it is understood, in that event, to supply a part, if not the whole of the residue; and there being every reason to believe that Virginia would, under such circumstances, enlarge her subscription, if necessary, to the extent of any possible deficiency.

Such deficiency might, moreover, if it occurred, be abundantly supplied by the resources and credit of the work itself. The Supreme Court of the United States, at its last term, put forever to rest, the claims of certain individuals, under the charter of the old Potomac Company, to the surplus water of the canal; and Maryland, in her act to compromise the late dispute between the Canal and the Baltimore and Ohio Railroad Companies, concurred with Virginia, in enlarging the power of the Canal Company over the surplus water of the Potomac river; the natural highway, as well as the common subject of jurisdiction of those States. To the sale or rent of a vast water power, the company may add, the augmented revenue of the canal itself, the navigation of which will have been extended, within the compass of a single year, from twenty-two, to one hundred and nine miles, besides the added navigation of ten miles of slack water, above its remotest feeder.

What the total revenue of the Chesapeake and Ohio canal may be, at some future day, the committee proceed to inquire, in order to complete the purpose, with which, this report was begun.

From the Treasurer's abstract of the receipts and disbursements of the company, down to the 31st of December last, it appeared that the revenue from tolls, at that date, amounted to the sum of $94,538 27. This sum included a very inconsiderable amount which was received, after the opening of the entire line of sixty-four miles, below the head of Harper's Ferry falls, in October last; the water having been speedily drawn off, to enable the contractors to complete the graduation of the part of the Baltimore and Ohio railroad, at the Point of Rocks.

The first tolls collected by the Canal Company, were received in August,

1828, after the surrender of the charter of the Potomac Company; but from that date, until October last, only twenty-two miles of the canal had been, at any time, navigable; and the rate of toll charged by the former company has remained unaltered till within the last month; except on a single article, rough stone, on which, it was reduced, soon after the opening of the canal below the Seneca feeder.

To arrive at the nett income of the company, for the above period, the charges for lock tenders, collectors, and repairs, should be deducted from the gross proceeds of the tolls.

The two first of those charges had amounted, on the 1st of January last, in a period of near five years and a half, to $9,831 75.

The repairs, except such as have had their cause and extent specially reported, according to a standing rule of the canal board, requiring a particular account to be rendered of every breach of the canal, have been hitherto, so blended, in the mode of making them, with the necessary improvements of the works for which final estimates had been given to the several contractors, that it is not possible, with any precision, to estimate them separately.

There had been expended on the above accounts, and charged in the Treasurer's monthly abstract of the 31st of December last, under the general head of "construction of the canal," $82,604, of which, $26,919 90 only had been expended for *specific* repairs, in the whole period which has elapsed, since the opening of a part of the canal in October, 1830.

A minute examination of this account would, however, show that the annual cost of repairs has been regularly declining, as the heavy embankments and walls of the canal have acquired stability, from time, and the improvements suggested by experience.

No breach has occurred, in the twenty-two miles of canal first opened, for a period of more than eleven months; and but two, on the line of forty-two miles which was opened in October last, and is now in use. The peculiar natural obstacles encountered on the first twenty-two miles, between Georgetown and Seneca, could not be overcome without exposing the canal to some hazard on the admission of water; the character and extent of which, time alone could disclose, and persevering industry effectually guard against.

In the construction of walls and embankments having their base, sometimes on stratified rock, and often in the bed of the river, and for considerable distances, elevated more than 50 feet above the ordinary height of a bold current, no human care could secure absolute perfection. It has been the work of experience, as well as vigilance, assisted by labor and capital, to supply its place.

The annual charge on the gross revenue of a canal, arising from the wages of lock tenders, and the salaries of collectors, it should be considered, is an almost unchangeable amount, dependent on the number and relative position of its locks, and on its length and intersection by other channels of communication; while its tolls increase with the use of its navigation, and that, with the development of the resources of the country whose commerce it facilitates.

The Erie and Champlain canals of New York were begun in 1818, and opened throughout in 1823; since which periods, their tolls have increased, from the inconsiderable sum of 5,437 dollars, received in 1820, to $1,422,695 22, their amount for the last year. (Vid. App. M.)

The coal trade, alone, of the Schuylkill Navigation Company of Pennsylvania, has risen, in nine years, from 6,500, to 252,971 tons; and its tolls, levied on that single commodity, from 9,700 dollars, to 228,138 dollars. (Vid. App. N.) From these facts it is manifest, that the future revenue of the Chesapeake and Ohio canal cannot be inferred from its past receipts on twenty-two miles, only, of its expected extent.

Like other channels of trade and intercourse, it must reach the country, whose resources it is designed to bring into active use, before it can become profitable to its stockholders, or give life and animation to the markets in which it terminates. Its most sanguine friends have never hoped for themselves, nor promised to the public, a remuneration for the expense of its construction, before it shall have entered the lumber and coal region, above the mouth of the Great Cacapon; nor will the full fruition of the benefits, which it offers to them and to their country, be realized, till this channel of trade and intercourse shall have arrived at its destined limit, in Pittsburg.

Very few, if any canals, that have been hitherto constructed, would have yielded any profit whatever on their stock, if their trade had been limited to the commerce of the country which they penetrate, at the period of their commencement.

The most profitable, if not the only *very profitable* canals in Great Britain are those, which derive their chief revenue from the carriage of coals: a revenue, in most cases, created by the canal itself. The celebrated canal of the Duke of Bridgewater, which connects the Worseley coal mines with Manchester and Liverpool, was begun exclusively for that purpose; and it is believed, that no canal, in England or Scotland, made for the transportation of coal, has failed to yield a profitable return on its capital. This arises, as well from the consumption of this mineral in so many useful arts, of which it is the *primum mobile*, as from the very obvious fact, that the weight of the fuel which any family annually consumes, in any temperate or high northern latitude, exceeds, very far, the aggregate weight of all the other commodities required for its support and comfort.

In a country where extensive forests no longer exist, those canals which supply limestone, and lime for building and the wants of an improving agriculture, will rank next in profit. The metals, and especially the most valuable of them all, iron, in its crudest form, and in all the various stages of its manufacture, will be found, where it abounds near the margin of a canal, to constitute, next to mineral coal and limestone, the source of its greatest profit. Where all these sources of revenue are to be found on a canal, in quantities inexhaustible, and directly co-operating towards their mutual consumption and use, such canal will have a decided superiority over any three canals, on each of which, one only of those commodities exists, although each may be profitable to its stockholders.

On the most profitable canals of America, lumber in all its forms, and the rudest production of the forest, firewood and bark, enter largely as a source of revenue, supplying, as on the Erie canal of New York, the place of coal and iron. Where all those commodities abound on the same line of canal, its revenue from them will depend, in some degree, upon their relative distances apart; since the profit to be derived from the tolls chargeable upon them, will be proportioned to the spaces through which they are carried, in their heaviest and rudest form—the coal before it is coaked; limestone, prior to its calcination; the ore, as dug from its bed; the tree, as it lies felled by the axe.

However profitable, therefore, may be many of the canals of Europe, it is erroneous to suppose that such improvements are better adapted to a manufacturing and highly commercial country, than to one rising to cultivation from the shade of its primeval forests. The approximation of the tonnage of the United States towards that of the most commercial nation in Europe, arises from the very large proportion, in size and weight, that its heavy and bulky commodities bear, to those, which, in a highly improved condition of the arts, comprise the wages of ingenious labor, and the profits of large capitals, in very reduced dimensions.

These preliminary remarks will prepare an unprejudiced mind for the ready conception of the vast extent of the revenue, which may be confidently anticipated, from the Chesapeake and Ohio canal, when it shall have reached its ultimate destination. Its eastern section, singly regarded, passes through, and terminates in, a country eminently distinguished by the possession of all the resources that contribute to swell the income of the most profitable canals in Europe or America. Sandstone of the most desirable quality, such as may be seen in the front steps of the Capitol, is obtained on the side of the canal, at the distance of twenty-four miles from its eastern termination. Soapstone and granite, from the intermediate space. Within the first forty miles, its channel is sunk in the very bed of the quarry, which supplied the beautiful marble columns of the hall of the House of Representatives. Limestone of all qualities, from that of the coarsest grain, to the finest statuary marble, including many varieties of color; and hydrates of lime suited for water cement, are to be found in the first seventy-five miles. After entering the limestone region, which borders the canal, for more than eighty miles, at the distance of fifty from Washington commence beds of iron ore, once profitably worked, but long since abandoned for want of fuel. Passing the head of Harper's Ferry falls, the canal washes the base of an ore bank, and runs directly opposite to one in Virginia, yielding a very profitable return at the large iron manufactory of Antietam, notwithstanding the proprietor is exposed to the disadvantage of paying twenty cents a bushel for the coal which he consumes, after a transportation of more than one hundred and forty miles, by an obstructed navigation. Mines of iron ore of excellent quality have been discovered, at various intervals, on the residue of the line of canal, as high up the valley of the Potomac, as the base of the Alleghany; where very rich fields of bituminous coal are found, on the margin of the river, as well as in the vicinity of Cumberland. (Vid. App. O.)

After passing the cultivated country, between the mouth of Monocacy, and the foot of the North mountain, including the fertile valley of that river, and the much more extensive valley of the Shenandoah, along with that of the Antietam and of the Conococheague, the canal will, on reaching the Cacapon feeder, at the distance of one hundred and thirty miles from Washington, after passing below a large field of anthracite coal, enter the most extensive lumber region in America. It may be regarded, as extending from the North mountain to the Alleghany, a distance of one hundred miles, if measured by the canal, and as stretching, laterally, to the head of the practicable navigation of the numerous tributaries of the Potomac.

The Chesapeake and Ohio, unlike the Erie canal, traverses, for a great part of its way, one of the most broken countries in the United States. By its eastern section it penetrates, and by its western passes through the broadest belt of mountains on this continent.

This belt spreads to the east and west, from its highest elevation, to the Blue ridge and the Laurel hill; occupying a space of not less than one hundred and forty miles in breadth.

Within these natural limits, and an east and west line extending to the north, midway between the Juniata canal and the Potomac, and a parallel boundary near 200 miles to the south, between the head waters of the James and Shenandoah rivers, are comprehended, along with the geographical centre of the largest State of this Union in point of territory, and the most fertile and extended valley below the Alleghany, a vast forest overshadowing a surface exceeding 16,000 square miles; three-fourths of which, being inarable, will furnish an unfailing supply of lumber of every description, to the common thoroughfare of its productions, agricultural and mineral. Coal, both bituminous and anthracite, iron, and limestone, lie embedded below its diversified surface, in the vicinity of its numerous rivers and creeks, which afford, at high water, in their natural state, a navigation of five hundred miles, capable of being rendered, by the simplest improvement of art, as permanent, as that of the canal, into which, they will pour their abundant supplies.

Of this navigation, the Shenandoah and its branches, alone, afford two hundred, the South Branch one hundred, and the two Cacapons eighty miles.

The Opeccon has been surveyed for the purpose of rendering it navigable as far as the chief town of the county of Berkeley, and is susceptible of similar improvement, up to the vicinity of Winchester, in the county of Frederick, one of the largest inland towns of Virginia. The Antietam and Conococheague rising in Pennsylvania, and traversing the whole extent of the fertile county of Washington, in Maryland, could be made, at little cost, to add fifty miles to this navigation.

Below the Blue ridge, an improvement of Goose creek, and of the Great Monocacy, it has been ascertained by a careful examination and survey. would extend this navigation seventy miles farther, into the county of Fauquier through that of Loudoun, to the south, and through the most populous county of Maryland, to the Pennsylvania county of Adams, to the north of the Potomac.

The various dams already erected, across the channels of the last four of these streams, afford facilities for reducing the cost of their navigation, while the numerous mills, and other manufactories on their banks, will amply repay, by a reasonable toll upon their imports and exports, the capital expended on their cheapest possible outlet to market. The improvement of the Shenandoah has long been confided to an independent company. A charter for the improvement of the navigation of Goose creek, has been recently granted by Virginia: and one to improve the Monocacy, by Maryland.

An authority to render navigable the rivers of Frederick and Washington counties, was early vested, by the Legislature of Maryland, in the late Potomac Company. It passed on the surrender of their charter, to their successors, the stockholders of the Chesapeake and Ohio Canal Company; who have unanimously consented to transfer this authority, to any new associations that may be formed, for the improvement of their navigation.

Pennsylvania has granted an act of incorporation, for the improvement of the Conococheague; and is deeply interested in the construction of all the northern branches from the eastern section of a canal, which will shortly pass, through the town of Hancock, within a mile and a half of her southern border.

There are mills on the head waters of the James and Shenandoah rivers within eight miles of each other, and no mountain separates them. Whether these rivers can be united by a canal, remains to be determined.

The Monocacy, especially, derives additional importance from its copious and gentle current; the fertile country on its banks; and the near approach of its head waters to those of the Conewago branch of the Susquehannah, with which, it has been reported practicable to connect it, by a continued canal, striking that river very near the entrance of the Union canal; by which, and the "Schuylkill navigation," an inland water communication of two hundred and eighty miles, wholly independent of the Chesapeake bay, would be opened with the market of Philadelphia, and one of a hundred and forty miles, with the seat of Government of Pennsylvania. By the State canals and portage railroad of this enterprising commonwealth, an inland navigation, with the exception of thirty-six miles of railway, would then exist, between Washington and Pittsburg, less in extent, by twelve miles, than that which unites the latter, by the Union canal and the Schuylkill, with the city of Philadelphia.

Such are some of the characteristic features, the resources, and facilities of internal navigation, of the extensive country bordering on the eastern section of the Chesapeake and Ohio canal, all of which naturally seek an outlet to the ocean by the channel of the Potomac; but, to which, the Baltimore and Ohio railroad, at the Point of Rocks, presents a choice of the third market in America, and, through it, a ready access to all the markets of the world.

The committee have shown that the Chesapeake and Ohio canal has upon its borders, and on those of the various tributaries of the Potomac, coal, limestone, iron, and lumber; that these several commodities exist, to an almost boundless extent, and under the most favorable circumstances for yielding profit to the canal which transports them, and which, cheapening the freight of their transportation, by its enlarged dimensions, secures alike to the rude material, and its manufactured product, the advantage of a favorable competition in the domestic, as well as foreign market of consumption. Here they might end this branch of their inquiry.

But a standard to measure the future revenue of this canal, although by no means perfect, yet approximating the truth, more nearly than any other that can be devised, may be derived from the actual profits of similar works, with a proper discrimination of the peculiar circumstances which affect their incomes, including an examination of the various sources from whence it accrues.

The two most profitable lines of artificial inland intercommunication in America, are the Erie canal of New York, and the Schuylkill navigation of Pennsylvania. The stock of the latter, though once much below par, was selling, prior to the late declension of all the American markets, at from 128 to 130 dollars for 50 dollars paid. No similar measure exists of the value of the New York canal, since it is the property of the State. Various calculations have been made of the original cost of its construction, and its tolls are subject to such modifications as the pleasure of the Legislature may give them. Of its tonnage, no public account is given for the last year. From a report of a former committee of this House, it appears that its descending tonnage amounted, in the year 1826, to 269,795 tons, of which 150,226 tons, being more than a moiety of the whole, consisted "of sawed lumber, timber, shingles, staves, and cord wood; to which might be added," say the committee, "in estimating the contribution of the forests of New York

to the revenue of the canal, 7,681 tons of ashes; leaving the portion of the descending tonnage composed of all other commodities, less than 112,000 tons." (Vid. Rep. No. 141, of February 11, 1828.) Of this, "flour, wheat, coarse grain, 'and provisions,' furnished all but 30,000 tons; and of the residue, domestic distilled spirits, stone, bricks, and lime, more than a moiety. Of the small remainder, since the discovery of water lime, in abundant quantities, on the eastern, as well as on the western section of the Chesapeake and Ohio canal, there is but a single commodity which that canal is not known to supply. Salt will be furnished, to the latter, from the Youghiogeny, where it exists in abundance, alongside of the coal which facilitates and cheapens its manufacture, and consequently its price to the consumer." Gypsum, alone, remains to be discovered on the Chesapeake and Ohio canal, to assure to it every source of revenue which the Erie canal derives from the adjacent country. Of the ascending tonnage of the Erie canal, in the year 1826, only 28,000 tons out of more than 300,000, or less than one-tenth, being of merchandise, could be ascribed to the extensive foreign trade of the city of New York; and but 27,000 dollars of a revenue of 687,000 dollars, being less than five per cent. of its total amount, was derived from the western extreme of that canal, or the lakes.

In neither the ascending nor descending tonnage, did there appear, in the table of the collector of West Troy, at the junction of the Erie and Champlain canals, which had then been six years in use, any one of the following commodities; iron, coal, marble, or salted fish, except the first; and, of that, not a pound of bar iron or castings, and less than 1,000 tons of pig, doubtless from Lake Champlain.

The manufactured iron, in bars or castings, required for the consumption of the interior, was included, it is presumed, under the general denomination of merchandise. Notwithstanding those deficiencies, if a just computation be made of the original cost of the Erie canal, by excluding the annual interest paid on sums borrowed for its construction, the receipts of 1826 amounted to very near or quite 9 per cent. upon the capital actually vested in that noble enterprise.*

Its tolls for the year 1833 amount to $1,290,163 20, being the receipts of eight and one-third months. But 9,623 dollars were collected in the first ten days of December last; on the 11th of which, the canal was closed at Albany.

Notwithstanding the augmentation, by near 100 per cent., of the tolls of this canal, in the lapse of seven years, among the various commodities which passed Utica, in 1833, there were but 808 tons of iron, and 2,867 tons of coal. Within this period, the quantity of merchandise, passing by the same point, has been much more than doubled; that, of the last year, embracing 70,248 tons.

Its total tonnage, as in the year 1826, consisted chiefly of the produce of agriculture and the forest; flour and wheat yielding, in 1833, 400,000 instead of 80,000 tons. Gypsum, so abundant along the margin of the New York canal, afforded but 9,000 tons, or but a third of the quantity which ascended the Schuylkill, from Philadelphia, in the same year.

The tonnage of the coal, alone, (600,000 tons,) raised in Pennsylvania, and transported, in the last year, by three channels of improved navigation, the Schuylkill, the Lehigh, and the Hudson and Delaware, in their

* Mr. Clinton computed the cost of this canal at 23,000 dollars: the canal commissioners after his removal from their board, at about 18,000 dollars a mile: in the former sum, interest on the canal loans was embraced.

aggregate length, not much exceeding two-thirds of the Erie canal, approached very near the entire tonnage of the commodities, which passed Utica, in the same period.

The rapid growth of the western part of New York, a consequence of the opening of the Erie canal, has caused, in the progress of seven years, a very striking change in the relative proportion of its tonnage from the two most fruitful sources of its revenue, agriculture and the forest. A more than fivefold increase of the former has elevated it above the latter; an effect resulting, doubtless, in part, though, to what extent, no public report has demonstrated, from the agricultural exports of Ohio, since the completion of the great canal of that flourishing State.

As the agriculture of New York encroaches upon its forests, the canal revenue derived from the latter will gradually decline, and may ultimately, at no distant day, disappear. The income from lumber, and its associate productions, boards, staves, shingles, firewood, and ashes, will then be restricted to importations, for home consumption, through the lakes, or the Atlantic.

In process of time, the growing population of this State will overtake her agricultural supplies of subsistence, and the surplus productions of all her lands, stock, and labor, will assume the condensed form of manufactures: augmenting greatly her general wealth, and the value of her internal commerce, but adding very little, if at all, to the tonnage of her great thoroughfare.

Its tonnage may be, indeed, greatly diminished, unless imported coal, or iron, or both, shall supply the place now occupied by exported lumber and grain. This will not be deemed an unfounded conjecture, by those who, turning to the last two semi annual reports of the Liverpool and Manchester Railroad Company, shall perceive that the entire receipts of that road, for the last half year, exclusive of the revenue derived from the transportation of persons, were drawn from 92,247 tons of merchandise, and 40,000 tons of coal: the former being, when doubled for the year, less than a moiety in amount, of the tonnage supplied to the Erie canal by agriculture alone, in the same period.

This tonnage includes, not only all the merchandise which passed between the towns, at the two extremes of this road, but 28,000 tons from its intermediate branches.

How short a distance on this road, thirty-one miles only in extent, the 40,000 tons of coal must have been carried, the inconsiderable nett revenue of £1,511, derived from that source, sufficiently manifests. Its toll of four pence or eight cents per ton, per mile, for the transportation of other commodities; and at the slowest speed, in open carriages, a penny halfpenny, or three cents, and in the swiftest and best carriages, two pence halfpenny, or five cents, for each passenger, reconciles the fact of the very limited tonnage of this road, limited, considering the magnitude of the cities which it unites, and the vast foreign trade of Liverpool, to the declared dividend of $8\frac{2}{5}$ per cent. for the last year, on the sum of £1,080,000, expended on its construction, and necessary appendages.

Were the comparison instituted between the actual receipts of the Erie, and the future revenue of the Chesapeake and Ohio canal, extended through both sections of the latter, to its termination at Pittsburg, the views here taken of the probable superiority of the tonnage of the latter would be confirmed, rather than impaired. The superior dimensions of

the one, having been demonstrated by the United States Board of Internal Improvement, (vid. App.) to make up, in economy of time, and expense of transportation, for the greater elevation which it has to surmount. Those dimensions having been since considerably enlarged, that superiority has been extended from 58, to 71 per cent.; thus amply atoning for the greater cost, thence resulting, of the larger canal; and leaving both works to rest, for a correct comparison of their relative advantages, upon other discriminating circumstances.

The committee having determined to make a separate report on the western section of the Chesapeake and Ohio canal, forbear, for the present, to add more than a brief exposition of the relative advantages to New York, herself, for an intercourse with the Ohio and the lakes, by these two lines of intercommunication. By the Hudson river, the Erie canal, the navigation of the lake, the transit of fifteen miles over land to Waterford, on French creek, and the descent of that creek and the Alleghany river, the city of New York is, now, distant from Pittsburg seven hundred and eighty-five miles; and the want of uniformity in this chain of connexion creates the necessity, after stowing a bale of merchandise in a sloop, at New York, of four transhipments, viz. at Albany, Buffalo, Erie, and Waterford; and encountering, for 82 miles, the dangerous navigation of the lake, exposed to storms at all times, and in a war with Great Britain, to hostile fleets.

Since the completion of the Delaware and Raritan, and the Delaware and Chesapeake canals, New York is connected with Baltimore, by a line of inland navigation not exceeding two hundred and twenty miles, susceptible of use, by a steamboat of one hundred tons burden; and should the Maryland canal be hereafter constructed, as can scarcely be doubted, the same boat, after the completion of the Chesapeake and Ohio canal, may, by renewing its voyage, reach Pittsburg, at the end of three hundred and eighty-seven miles from Baltimore, and six hundred and seven from the city of New York; thus saving one hundred and seventy-eight miles of transportation, and four transhipments. With two transhipments, the same result may be accomplished; provided the railroad from Baltimore to Washington shall supersede a future resort to a canal communication between those cities, and the place of the contemplated tunnel, and numerous locks through the Alleghany, be supplied, by inclined planes and a portage railway. (Vid. App. P.)

Extending this comparison one step further, so as to embrace the entire purpose of the convention in which the Chesapeake and Ohio canal originated; a connexion between the Atlantic and the Western lakes; and regarding Detroit as a point common to the Northern and Southern routes, it will be found that the latter offers to the great and growing emporium of American commerce, a connexion with the Northwestern lakes, somewhat longer, it is true, than that by the Erie canal, but attended with this peculiar advantage, that in consequence of the action of the Spring winds on the floating ice and current of Lake Erie, and the milder climate of the South, it will be capable of use near four weeks earlier in every spring, and a fortnight later in ever autumn, than the route by Buffalo.

The line of improved navigation, in America, the capital stock of which commands the highest price, is that which derives its present tonnage, from sources identical with those of the Chesapeake and Ohio canal.

The income of the Schuylkill Navigation Company, since their first reception of tolls, in the year 1818, supplies numerous details confirmatory of all the principles relating to the revenue of canals, which have been comprehended in this report. (Vid. App. N.)

The Schuylkill rises on the eastern border of the great belt of mountains common to Virginia and Pennsylvania. Its length is, therefore, much shorter; it drains a much less extensive country, and discharges much less water than the Potomac. Although connected with the Union canal, it has in fact no large tributary. Its improved navigation accommodates, however, a territory alike diversified with that of the Potomac in soil, and productions, agricultural and fossil. Its tonnage, the result of its improvement, has been the growth of sixteen years; for seven of which, the revenue derived from it, did not exceed $2,000; although it comprehended, in the year 1833, 445,849 tons, yielding a gross income of $325,486 63. More than a moiety of this tonnage consisted of coal, which paid a toll of $228,138, exceeding two-thirds of the entire revenue of the Schuylkill Navigation Company, including $16,673, derived from the rent of surplus water.

Of the remaining 217,711 tons, limestone and lime yielded 65,494; gypsum 26,494; iron, in its various forms of crude, blooms, pigs, castings, bars, and nails, 25,786; and lumber, including wood and bark, 18,203 tons. Its gypsum alone, although imported from abroad, was within 1,500 tons of the quantity of merchandise carried up the Erie canal, in 1826. Flour and grain, which, in agricultural districts, are regarded as the main staples of internal trade, and the chief source of profit to the artificial channels by which they are transported to market, supplied on the Schuylkill, in the last year, notwithstanding that river descends to the second city of the United States, through a highly cultivated country, but 23,165 tons: or very little more than a twentieth of the entire tonnage of this very profitable navigation.

Its total length is 108 miles, or within a mile of the actual extent of the nearly completed portion of the Chesapeake and Ohio canal, exclusive of the basin of slack water above its highest dam. It consists, however, of but 62 miles of canals of various extent, united by 28 guard locks, with navigable ponds of slack water, formed in the bed of the river, by dams across its channel. These artificial ponds or basins are denominated pools, in the annual reports of the company, and constitute 46 of the 108 miles of navigation, connecting Philadelphia with Mount Carbon, in one of the three great coal districts of Pennsylvania. In its ascent, from the tide, this line of improved navigation, overcomes an elevation of 588 feet; which exceeds the elevation of the entire eastern section of the Chesapeake and Ohio canal. Its locks are 120 in number, of which 92 are lift locks, constructed of rough stone walls, lined with plank. These have been found, according to the last annual report of the directors, to "require a heavy outlay for repairs;" and for that reason, the report announces, that, while correcting another error in the original plan of this work, its President and Directors propose "in doubling the locks, wherever there is more than a single one, to construct the new locks of *cut stone*, with *hydraulic* cement." The wooden locks are 80 by 17 feet in their chamber, while those recently constructed of stone, are 80 by 13½ feet only; and among the advantages of this reduction of the breadth of the lock, the report comprises "the saving of water." One reservoir, 41½ feet deep, has been already provided; and another is contemplated, in order to supply a possible defect of water in a

part of this line of navigation. The report suggests that "by the doubling of the locks, more lock-tenders will be required;" and the number of the houses for their accommodation being, at present, but 65, a number exceeding very little that of half the locks, indicates that two or more locks have been frequently combined, in their construction, and placed under the care of a single attendant. The locks, both new and old, admit of but four feet depth of water, upon their mitre sills, and that is, consequently, presumed to be the depth, also, of the various canals; a depth which, combined with the length and breadth of the new locks, affords a construction of both, adapted to the use of boats of 40 tons, drawn by two horses, aided by two men and a boy: the complement of force, sufficient for propelling a boat of 100 tons, on the Chesapeake and Ohio canal.

The cost of this line of 108 miles of improved navigation has been, according to the last annual report made to its proprietors, $2,974,659 69, a sum exceeding the ascertained cost of the correspondent portion of the canal, on the Potomac, now nearly completed, provided a due allowance be made for the difference in their plans and construction.

As a plan of navigation for the entire valley of the Potomac has been frequently recommended to the Chesapeake and Ohio Canal Company, and was once proposed for the James river, by a late engineer in the service of the Board of Public Works of Virginia, the committee beg leave, for a few moments, to call the particular attention of the House to one relative aspect of the comparison which they have instituted, between the profits of the Schuylkill navigation and of the Chesapeake and Ohio canal. It is, that the latter is to be a continuous canal, and the other consists, in part, of a series of pools, sustained by dams, and connected by locks.

There are many small streams, subject to very little alluvial deposite, like the Antietam branch of the Potomac, and some considerable rivers, of gentle current, very high banks, and comparatively narrow breadth, like the Great Kenhawa, which may be judiciously improved by dams, forming artificial basins and locks, either within those dams, or in short canals, passing around them, from one level to another. Even where such a mode of improvement would be attended with great cost, a cost even greater than that of a continuous canal, still it should be preferred, if the preservation of a uniform system of navigation, throughout an extensive commercial channel, render it necessary to avoid frequent transhipments. But for some distance, as along the great falls of the Potomac, a system of dams and locks was impracticable, as it would be, through the far greater part of the mountain sections of this canal, for various reasons. Uniformity, therefore, instead of being promoted, must have been sacrificed, and, it is believed, economy also, had such a system been adopted for the Potomac valley. Steam is not yet used as the propelling force on any canal in the world. And if mere animal power be regarded, as it every where continues to be, the moving spring of canal navigation, very serious objections arise to the intermingling of canals with broad, deep, and extensive pools of slack water, having a towpath along their margin, for the trackage of the canal boat. The broader and deeper the river to be so improved, the more injudicious will be such a combination. To a certain degree, such a combination of canals with wide pools, would deprive any line of inland navigation of the peculiar advantages of each. It surrenders the certainty and safety of the continuous canal, without the indemnity of a cheaper propelling power, applicable to boats of enlarged dimensions.

The last report of the managers of the Liverpool and Manchester railroad, of which, an extract will be found in the appendix to this report, ascribes the increase of the tonnage of that road, for the last half year, to the frequent storms and high winds which obstructed the descent of the Mersey and Irwell, and the Bridgewater canal boats to Liverpool, along the broad expanse of the Mersey, below Runcorn.

It is a notorious fact, that the river boats of the Potomac had sometimes to lie by, for days together, at various harbors above, as well as immediately below the old tide locks near Georgetown, on account of high winds; which frequently prevent the ordinary traveller from crossing, at the ferries of this river, very far above its principal falls.

The President and Directors of the Schuylkill Navigation Company, comprise in their last annual report, among the causes which rendered the liberal grant of $300,000, for certain improvements in their navigation, "insufficient, the *delays* and *losses* incident to unusually frequent *freshets* on the *river*, and heavier damages allowed to individuals than were expected."

The objections to the system of lock and dam navigation, which was considered and rejected in all the examinations and estimates which preceded the commencement of this canal, and which has been so long exploded and abandoned in Europe, but yet lingers, it would seem, in America, are great, manifold, and obvious; especially where the towpath, along a broad river, liable to frequent and heavy freshets, supplies the place of an independent and continuous canal.

They may be comprised under the four following heads: 1st. The diminution of the propelling power of the boat, arising from its more indirect application. This necessarily results from the elevation of the towpath many feet above the ordinary surface of the river, to avoid its frequent inundation, and the increase of the horizontal distance of the boat from the line of traction, or towpath; an objection which can be overcome in the lowest state of the water of the pools, only at much previous expense of excavation under water. Upon a *well constructed* canal, even, this loss is equivalent to a deduction of twelve or fifteen per cent. from its tracking power. 2dly. The occasional suspension of the navigation of the pools, by freshets, at all seasons, and by floating ice, trees, and brush, in winter and spring, involving in great hazard the cargo of the boat, and the safety of the persons on board. 3dly. The very obvious and serious augmentation of the labor of preserving the boat channel unimpeded by alluvial deposites of trees, brushwood, earth, sand, and gravel. And, lastly, the absolute although most uncertain dependence of an entire line of improved navigation, however extended, on the constant preservation or instant renewal or repair, often impracticable, of every dam of the very many which its use requires.

Apart from the absolute impossibility of passing the Great falls of Potomac, by dams and locks, the ascent of 578 feet in a distance of 188 miles, could not have been effected, without the erection of twenty-nine dams, each of very near twenty feet elevation, allowing nothing whatever for the depth of navigable water required at their base, to enable the boat to reach the next pond. These dams would have varied, in length, from between 2,560 and 500 feet; and the failure of any one of them, through defective construction, accidental injury, or decay, to keep up the necessary depth of water in every pool, would have totally arrested the entire navigation between

Washington and Cumberland, till such dam should be repaired or reconstructed. Should such a failure have occurred in the winter or spring, requiring a whole summer and autumn for a remedy, it would have involved the loss of a year's income, not to the company alone, but to the whole country dependent, on this uncertain mode of navigation, for access to market.

The actual canal, on the other hand, will have but eight of these structures, three of which are less than six feet in height, and are exposed, by their plan, to no damage that a few weeks' labor might not suffice to repair. The actual destruction of no one of them all, except that at the head of the line of navigation, which they all merely feed with water, need suspend the navigation of the canal altogether; though the loss of several, at the same moment, would render it difficult and inconvenient to keep up, at all times, an adequate supply of water. The number of dams upon the Schuylkill is unknown to the committee, but, if indicated by the number of guard locks, as is probable, it embraces no less than twenty-eight.

The Schuylkill navigation, as has been remarked, unlike the Potomac, receives no considerable tributary river, but it resembles the eastern section of the Chesapeake and Ohio canal in a very important particular, common to both, their connexion with the Ohio. The first sixty-one miles, reaching to within three of Reading, is part of a chain of inland navigation connecting, by means of a portage railroad of thirty-six miles across the Alleghany the State canal of Pennsylvania and the Union canal between the Susquehannah and the Schuylkill, the tide of the Atlantic with the town of Pittsburg. This extensive connexion, very recently completed, is, in length, 438¾ miles, of which the "Schuylkill navigation" supplies sixty-one miles, the Union canal eighty-two, and the State canals and portage, between them, 295¾ miles. Its total lockage is 1752 feet.*

In this distance, which exceeds the proposed connexion between the tide of the Potomac and the same point on the Ohio by very near one hundred miles, besides the interruption of a portage over land, there are three lines of navigation, formed on distinct and independent plans; the smallest of which, the Union canal, in consequence of the very reduced dimensions of its locks, will admit of the passage of no boat exceeding in burden from twenty to thirty tons.

The width of this canal, at the surface, is but thirty-six feet, and its depth of water but four feet; its locks are seventy-five, by eight and a half feet, in the chamber. Those of the Schuylkill, it has been seen, comprehend two several dimensions, each of which varies from the locks of the State canals, of the Susquehannah, Juniata, Conemaugh, Kiskiminitas, and Alleghany rivers, which are all parts of the same line. In order to reach the Susquehannah, by this line of navigation, in addition to thirty-two locks on the Schuylkill, a rise and fall of five hundred and twenty feet, distributed among ninety-one locks, must be passed on the Union canal. To reach the portage a further lockage of 398 feet must be encountered, and to pass it, a rise and fall of 2,570 feet in 36 miles of railway.

Although the superiority of water, over any known species of land carriage, for heavy and bulky commodities, be so far established by experience, as to secure to the Union canal, small as are its dimensions, the

* This lockage is less by 1,406 feet, than that of the Chesapeake and Ohio canal; an advantage much more than counterbalanced by the continuity and enlarged dimensions of the latter.

transportation from the Susquehannah to Philadelphia of all the heaviest products of the vast country drained by the navigable waters of that river, yet they will manifestly reach their destination, at a price augmented by an expense of carriage beyond the corresponding charge upon those from the head waters of the Potomac. (Vid. App. R.)

For the supply of bituminous coal to the markets of the Atlantic, as well as of lumber and iron, the Chesapeake and Ohio canal will, therefore, possess a decided advantage over this line of improved navigation, highly valuable as it now is, and will probably continue to be. (See App. S.)

Before closing this comparison of the relative advantages of the Chesapeake and Ohio canal, and of the two most profitable works in the United States, the Erie canal and the Schuylkill navigation, the abundant, though cheap produce, which the former will draw from the estuary of all its waters, the fisheries of the Potomac, below tide water, should not be omitted.

At numerous fishing shores, some of which rent as high as $3,000, several thousand laborers are employed, every season, in supplying this wholesome and nutritious food, to an extent, which has reached, in a single spring, many thousand tons. Extensive as is the present market for this food, many millions of herrings, of which 1,300,000 have been caught at one haul, are thrown away or spread over the fields, as manure, for want of a sufficient demand for their immediate consumption, or of labor to cure them; a waste, which will never occur, after the Chesapeake and Ohio canal shall have opened a western market, or penetrated, by its eastern section, to the base of the Alleghany. Fish, which so moderately enlarges the tonnage of the Schuylkill navigation, will then largely contribute to the revenue of the southern canal. (Vid. App. T.)

Compared with other channels of supply for coal, whether bituminous or anthracite, as with that of the "Lehigh navigation," composed, as the Schuylkill, of canals and pools of slack water for forty-five miles, and connected with the tide of the Delaware above Bristol, by a canal from Easton, $59\frac{3}{4}$ miles long, forty feet only at the surface, and five feet deep; or, with the more northern communication of the Hudson, from a point a hundred miles above the city of New York, with the Lackawannock mines of Pennsylvania, by means of a railroad of sixteen miles, overcoming, by five stationary steam engines and two self-acting planes, a rise and fall of fifteen hundred feet, leading to a canal of thirty-two feet breadth, encumbered by one hundred and ten locks, since the discovery of anthracite coal in the vicinity of the Potomac, within one hundred and thirty miles of tide water, no doubt can be rationally entertained that the Chesapeake and Ohio canal will share with those northern channels of trade, in the supply of this species of coal, not only to the extensive country intersected by it and its tributary rivers, but to the whole seaboard of the United States.

Its successful competition with other works in this very important trade, will be ascribable to those enlarged dimensions which give to its propelling power superior efficacy, and to its boats increased capacity, as well as to the uniformity of its extended navigation, in which it so greatly surpasses the system of the Pennsylvania canals.

In the supply of bituminous coal, it has not a rival north of the Potomac, that of the west branch of the Susquehannah being 264 miles from Philadelphia by water, or, should the Columbia route be preferred, 224 miles by a canal and railroad. (Vide App. O.)

In closing this protracted comparison, the committee disclaim any intention whatever of depreciating other channels of useful intercourse, all of which are indebted, for their origin, to the same liberal and enlightened spirit which animated the various Legislatures which have given their countenance and aid to the Chesapeake and Ohio canal. It would be a subject of merited reproach, if this work, following, in order of time, the great canals of New York and Pennsylvania, had not improved in some degree, upon their example, in its plan, construction, and cost.

Among the sources of revenue comprised in the receipts of the Schuylkill Navigation Company, the rent of surplus water has, in a few years, risen, as has been stated, to 16,673 dollars.

The charter of the Potomac Company expressly authorized, and seemed indeed, to require, such a construction of their various canals, as to fit them for the double purpose of navigation and manufactures. The charter of the Chesapeake and Ohio Canal Company, on the contrary, from an apprehension that this authority might be abused, by creating a current in the canal prejudicial to its navigation, has expressly limited such use of its redundant water, to the local position of its necessary wastes.

Experience, however, having satisfactorily demonstrated that on a canal of very enlarged dimensions, and fed by a considerable river, a large water power may be conveniently created, and judiciously applied to manufacturing purposes, especially in the vicinity of its dams, and along the levels of its feeders from them, the Legislature of Virginia readily acceded to the petition of the present Canal Company, for permission to dispose of its surplus water, without any other restraint on the power to do so, except that it shall be exercised without detriment to the navigation of the canal. Pennsylvania had, with her characteristic sagacity, in relation to the improvement of all her sources of national wealth, conferred this power, unsought, by her act of incorporation of 1826; and Maryland has recently concurred in the views of both her sister States, with certain modifications, arising from local, and, it may be presumed, as well as hoped, from transient considerations.

It only remains, at present, for the United States, the fourth party to the charter, to assent to an amendment, alike beneficial to the canal and the public, in order to place the surplus water of the Potomac, which the former company were authorized and advised to apply to manufacturing purposes, at the disposal of their successors. Instead of proving injurious to the navigation the dams which the company may hereafter multiply across the river, will, by deepening the water upon its natural bed, extend the benefits of the canal to boats from the opposite shore of Virginia, while they will, also, eminently contribute to the general health of the adjacent country, by covering those numerous shoals and stagnant pools which, in the heat of an autumnal sun, send forth their unwholesome effluvia. (Vid App. U.)

Commanding a fall of 578 feet, in the Potomac, the company will possess not only a source of revenue calculated, in aid of further subscriptions to their stock, to extend their canal, but to attract and fix permanently on its banks, the labor, capital, and skill, necessary to develop, and fit for the use and convenience of a great and increasing population, the inexhaustible mineral treasures that lie buried in the bosom of the adjacent country.

In the view which the committee are authorized to take of the Chesapeake and Ohio canal, as the shortest channel of inland navigation, be-

tween the Atlantic and the Ohio, that revenue, also, should be here included, which may be confidently anticipated from the transportation of persons, as well as property.

Since the introduction of light, but commodious packet boats, moving with the celerity of ten and twelve miles an hour, upon the English, as well as the Scotch canals, a doubt can no longer exist, but that this capacious canal may become a channel of personal and social, as well as commercial intercourse.

On the Ardrossan canal, which connects the manufacturing town of Paisley, with the great western seaport of Scotland, there passed, during the first six months of the last year, packet boats, drawn each by two horses, which made eighteen trips a day, to and from Glasgow, carrying an average of five and forty passengers, at the speed of ten miles an hour, and the moderate cost of a penny a mile for each person. During the months of July and August last, the number of passengers exceeded a thousand a day; and if this cheap intercourse could be readily sustained by night, as well as by day, without a single accident, on one of the narrowest canals of Great Britain, how much more easily, and securely from all danger, may it be accomplished, on that which, when completed, will be the largest canal in the world. A canal, the guard banks of which are every where wide enough to supply a second towpath, and the coal on the banks of which may, at no distant day, afford a substitute, in steam, for the frequent relays of horses which this rapid motion requires, so as yet further to cheapen the cost, and quicken the speed of this agreeable mode of travelling. (Vid. App. V.) And if the Chesapeake and Ohio canal shall hereafter become the chief thoroughfare, as it well may, of persons, as well as property, between the Atlantic and Western States, the seat of whose common Government it unites with the valleys of the Ohio and the Mississippi, the Gulf of Mexico and the great Northern lakes, its importance will be as inappreciable, in its moral and political influence, as its revenue will be unbounded, except by the express limitation of its charter.

It remains for the Government of the Union, whose early and liberal co-operation gave vitality to this noble enterprise—a Government which had, and yet retains, by far, the deepest interest in its success—to say, whether it shall stop, at the point at which it has now arrived, or proceed one step further towards the accomplishment of this, its leading purpose.

From the preceding narrative of the rise and progress of the Chesapeake and Ohio canal, it will be readily believed, that neither the State of Maryland, nor the town of Alexandria, whose original subscriptions, amounting to three-fourths of a million, were expressly dependent on that of one million of dollars by the United States; nor the other subscribers, corporate as well as individual, would have begun, or, had they even begun, would have given their sanction to the enlarged dimensions of this canal, without any indemnity to them for its additional cost, in an augmented rate of tolls, had they not, one and all, confidently believed, that if Congress co-operated, at all, in its construction, it would not, provided it were properly conducted, be permitted to fail, for want of adequate funds for its completion.

The report of the engineers of the United States, in 1826; the revision of their estimates by the civil engineers deputed by the Executive to re-examine the foundations of that report; the recommendations of two Presidents in succession, and of several committees of the House of Representatives; the subscription of a million to commence the enterprise, by so

large a majority of both Houses of Congress, while they denoted a preference of the most enlarged plan for this work, furnish conclusive evidence that neither House, nor any friend of the measure, supposed that this subscription would supersede all further application for pecuniary aid, since the total capital of the company, at this period, obviously falls short of the estimated cost of the smallest and cheapest dimensions and plans for this work, that were at any time submitted to the public.

The facts which are now presented to the House most clearly manifest, that the eastern section has not yet reached the extent at which it was believed, and stated that the canal would become productive of profit to its stockholders; and might supply, by its own credit and resources, a part, at least, of the necessary funds for its completion.

It has been shown that its plan and construction are in accordance with the principles of science, and the views of that board of engineers, at whose head, was then placed, a distinguished foreigner, acquainted with all the public works of Europe, and charged with preparing a plan for the common defence of the United States; that its mode of execution has been twice inspected and approved, by officers of rank and experience, selected and deputed, by the Executive, from the same scientific corps, who, with every facility afforded them for the discharge of their duty, could have had no motive to slight or neglect its performance: that its cost has fallen far below the prior estimate of this corps, and it may, and should be added, that every dollar of it, to an amount largely exceeding three millions, had been faithfully accounted for, at the date of the last annual report of the President and Directors. (Vid. App. W.)

As the 109 miles of the eastern section, about to be completed, will consume its subscribed capital, without further pecuniary aid from Congress, it must be promptly arrested in its course.

The consequent dispersion of its engineers and contractors, in whose ability, integrity, and industry, long experience has taught the company to confide, will prostrate the hopes of its friends, and greatly augment the future cost of its construction; for it cannot be seriously apprehended that any disaster will lead to the utter abandonment of an enterprise of such local, as well as national importance, so deliberately begun, and, as far as it has advanced, so steadily, and, it may be added, so faithfully and successfully prosecuted. A work which dates the general sense of its expediency from the middle of the last century; and the first efficient step to its commencement, from the issue of that revolution, of which, it may be truly considered, in the language of a great statesman, as one of the "earliest fruits;" a work, to which the great champion of that revolution, the beloved and revered father of his country, devoted the leisure of his repose from war; which a President of the United States, his companion in arms, distinguished for the prudence and circumspection of his whole administration, most zealously recommended to the favor of Congress; and to the propitious commencement of which his immediate successor, along with the labor of his hands, contributed the unqualified approval and energetic support of his powerful and well-stored intellect. (Vid. App. R.)

The Congress and people of the United States viewing, in this monument of their patriotism, a result of their present, and an imperishable bond of their future union; having cherished it, when it held out but the promise of success, and the hope of public benefit, will not, the committee persuade themselves, refuse to it their necessary aid, when it has but just overcome

the numerous obstacles to its progress, both moral and physical; after it has prevailed on an incorporated company, which pre-occupied its ground, to surrender their charter, and on the Legislatures of three States and of the Union, to co-operate in giving to it a corporate existence; after it has induced two of those Legislatures, in providing funds for its commencement, to combine the public revenue with that of three rival towns who had never, before, been known to act in unison with each other.

The interests which it tried, in vain, to conciliate, sustained by justice, it has encountered and defeated. It has finally triumphed over all its enemies. It has done even more than this. It has, by its firmness, patience, and moderation, converted its most active and formidable enemies, into as active and efficient friends. It has now, in truth, no enemies, and confidently looks for support to the source of its being—the Congress of the United States. It is not, at such a moment, that the Legislature of the Union will abandon the work, which has grown up, and, so far, prospered beneath their own eye, and which urgently appeals, for the means of its future growth, to their consistent wisdom and patriotism.

That this appeal assumes no new ground, but is, in all respects, conformable to the views presented to Congress, prior to the commencement of this enterprise, will be apparent, from a recurrence to those reports, on which, its zealous friends rested the success of the subscription by Congress, in 1828.

This committee beg leave, on the present occasion, to close their report in the language of their predecessors.

"The Committee on Roads and Canals," on the 30th of January, 1827, recommended a subscription of two and a half millions to the stock of this canal. Their entire report, which is embodied in that of their immediate successors, of the 2d of January, 1828, limiting that subscription to a million, says that "the committee now come to the last object of the memorialists, which is to procure a subscription to the stock of the Chesapeake and Ohio canal, of such amount, and on such terms, as they deem *essential to the commencement,* and calculated to *assure* the speedy accomplishment of their enterprise.

"The memorialists ask a subscription to the stock of the canal to the indefinite extent of a moiety of the sum which may be found necessary to its completion, or of a specific sum, supposed to be a moiety of that required for its extension from Georgetown to the mouth of Savage, or to the extensive coal banks at the base of the Alleghany.

"The committee have preferred the last form, and have accordingly recommended a subscription of twenty-five thousand shares of stock, to be paid for in not less than five annual instalments; so as to limit the annual payment by the United States to half a million of dollars, and the total sum subscribed to two and a half millions; and they have deferred any further subscription on the part of the Government, till the eastern section of the proposed canal be completed.

"Superadded to the conditions already noticed, the bill which the committee have framed requires, in order to give validity to any subscription whatever by the United States, that a sum, not less in amount than the above, shall be subscribed by other stockholders, whose good faith it secures by a practicable and adequate guaranty.

"As one of the motives of the subscription provided by the bill is to give to this great work dimensions adapted to future and permanent national

use, among the prescribed conditions of that subscription, the committee avail themselves of the scientific research of the United States engineers, to provide not only for an adherence to the transverse section recommended for the entire canal by their report; but to include a further provision for so enlarging the canal, as to reduce, wherever it is possible, without great additional expense, the resistance of the boat, for which the locks of the canal are calculated, to that, which such boat would have to encounter in the navigation of an indefinite expanse of water.

"The difference of the resistance which this boat would meet on a canal having a breadth of forty feet only at the surface, twenty-eight feet at the bottom, with a depth of four feet, compared with that which the same boat would have to overcome on a canal of the breadth and depth of that recommended by the United States engineers, demonstrates, irresistibly, the expediency of adopting the last dimensions, where practicable, for the entire canal; and an extension of the same principle warrants the proposed enlargement, where it can be effected, by "ordinary excavation," by which is understood to be meant that of common earth.

"Having required of the company, as a condition of the United States subscription, a structure of the Chesapeake and Ohio canal, which must considerably augment its cost, and which is designed to make it subserve purposes of great and lasting public utility, rather than of immediate profit, the committee felt themselves authorized, if not bound, to couple with the United States subscription, a concession, thus rendered as just, as it is expedient, since it might eventually prove indispensable to the prompt success of this great undertaking, that the Government of the United States shall forbear to exact any share of the common profit upon the stock which it subscribes, until all other subscribers shall have netted a reasonable return, or five per centum per annum, for the sums of money that they may have severally paid on account of their respective subscriptions.

"The subscription of stock in behalf of the United States, in very large proportions to the total amount required for the construction of very short canals, of easy execution, already commenced, or far advanced towards completion, having been already sanctioned by very large majorities of both Houses of Congress, the committee do not deem it necessary, here, to enlarge upon the power of Congress to authorize any such subscription. That, to the stock of the Delaware and Chesapeake canal, amounted to $300,000. The subscription to the Dismal Swamp canal, grounded on the condition of its enlargement, and requiring no correspondent aid from other subscribers, exceeded its original capital. That, to the Louisville canal, while in progress, bore a larger proportion to its antecedent stock.

"Two of these canals, it may be, moreover, remarked, are but expedient substitutes for a navigation before enjoyed along the Atlantic seaboard, circuitous, indeed, but at all times practicable, and safe in peace from any danger but of the sea; and the third, at the falls of the Ohio, for a navigation open at high water, to the descent of the largest ships; and impeded, in its worst condition, by a portage of but two miles, along the level bank of a river, through a flourishing town, affording every accommodation to the navigator, in the midst of very short delays."

The subscription, which the committee recommend, is to a work yet to be begun, but which, if successful, and of that no rational doubt exists, provided adequate funds for its execution be supplied, will supersede a navigation not only obstructed, but at all times dangerous, and a portage of many miles

over rugged and lofty mountains, separating a population of two millions from the residue of the same people, who are destined to multiply with a rapidity unexampled, but among themselves, on both sides of the great barrier to their friendly intercourse, which this canal is designed to surmount.

"The committee did not unanimously concur in recommending this subscription, without duly considering every other mode of accomplishing a work as essential, in peace, to the permanent union and commercial prosperity of the Eastern and Western States, as in war, to their common defence and safety.

"They were, moreover, aware, that its accomplishment, by the direct agency of the Federal Government, without the intervention or co-operation of a joint stock association, had been deemed, by respectable authorities, preferable to the mode devised by the charter of the Chesapeake and Ohio Canal Company. In this preference, however, all the difficulties in practice have been overlooked or disregarded, arising from the condition and claims of the existing Potomac Company, under their charter; from the express denial of the power of the General Government to construct a canal, by one of the parties to that charter; and from the contrariety of opinion, on this interesting topic, existing in both Houses of Congress, among those who, admitting the authority of the common Government, derive it from very different sources in the constitution, and disagree in opinion as to the legitimate mode of its operation.

"A larger number of those friends of internal improvement, it is believed, will be found to unite in this, than in any other practical use of this much contested federal power.

"The committee also believe, that expediency will recommend the mode of executing this great work, in which the Government of the United States has concurred, by the act of the 3d of March, 1825, and is now urged to co-operate by a subscription of stock.

"This expediency is fortified by the long continued experience of that European nation which, above all others, is most distinguished in every branch of political economy, and is, moreover, sanctioned by the authority and reason of the father of that science, if science it may be called, the distinguished author of the Wealth of Nations.

"All the canals of Great Britain, with but two exceptions, have sprung from the wealth and efficiency of joint stock companies.

"To incorporate private with public wealth, individual interest with public responsibility, in the execution and preservation of a work requiring vigilance to enforce a just economy in its construction, and circumspection to watch over its repairs, is alike the dictate of reason and experience.

"But if it were more expedient for the Government of the United States to construct and maintain, at its exclusive cost, works of national utility, it cannot be less prudent to enlarge the beneficial operation of the resources which it devotes to such purposes, by eliciting a moiety, at least, of that cost, from those private capitalists, who can be induced, but by the hope of gain, to quicken the diligence and watch over the integrity of the subordinate agents, commissioned to disburse the common funds, for the common welfare.

"The committee are sustained, on the ground of these suggestions, by the consideration that they have been long fostered by the legislation of one State, at least, of this Union; that they were originally incorporated

in its system of internal improvement, with this difference only, that, while the subscriptions of the funds of this State are limited to two-fifths only, or less than a moiety of the stock required for a canal or artificial road, promising great public benefit, it forbears any claim whatever to a share of the common dividend or profit of stock in any such work, till all other subscribers to the same stock shall have netted *six* per cent. per annum on their respective pecuniary contributions.

"It is the obvious tendency of such a system, to economize the disbursements of the public revenue when applied to internal improvement, and to extend the efficiency of a given expenditure, by combining it with that private capital which could not be otherwise elicited for the common benefit of the United States.

"If, in union with these principles, the public appropriations to canals and roads be renewed, from time to time, by the sale and reinvestment of the subscribed stock, whenever it shall have replaced the interest of the sums paid for it, and have reached a par value in market, a moderate annuity, devoted exclusively to internal improvement, may have its beneficent agency so widely extended over the United States, as to be competent to every reasonable demand for objects purely national.

"By transferring to the agency of an incorporated company, the construction and maintenance of each public work, so executed, that extension of the patronage and influence of the Federal Government, which is apprehended, from the application of the national revenue to works of internal improvement, will also be in a great degree precluded.

"A sum may be laid up, in peace, in an imperishable form, by the completion of works essential to the public prosperity and safety, which the assignable quality of the public stocks invested in their construction would afford to the Government a facility for applying to the first exigencies of future wars.

"The internal trade, which, in periods of national danger, or obstructed foreign intercourse, supplants, in whole or in part, the usual importations from abroad, will enhance the value of this resource, when most needed to aid the declining revenue of a Government, resting, almost exclusively, upon foreign imports, for the means of defraying all its most necessary operations.

"Against the possible objection that war might be wantonly waged, if, by anticipation, resources were provided to meet its first pressure, without a resort to direct taxation, the countervailing consideration arises, that, during its disastrous continuance, it would turn to its unprofitable and wasteful purposes, the means of extending those internal improvements which can hope for their accomplishment only from the leisure and abundance of peace. It is in peace, also, that the additional duties received on those multiplied returns from abroad, for the varied exports with which internal navigation supplies external commerce, would afford an immediate pecuniary recompense to the Government, for its liberal aid in the construction of canals, of national importance, leading into the interior.

"If the committee shall seem to have dwelt too long on considerations not peculiarly associated with the particular object of their present inquiry, their apology will be found, they trust, in the important bearing which these considerations must have on the question, whether, in the present stage of the great national work, which they presume thus earnestly to recommend to the favorable regard of the House, it be expedient

to extend towards it the pecuniary aid which the memorialists have invited.

"The committee cannot regard the subscription, proposed by the bill which they report, as disproportionate to the relative interest of the Government of the United States in the construction of the Chesapeake and Ohio canal, on the plan recommended by the Board of Internal Improvement. As a proprietor, interested in a work to which his subscription is invited; as the exclusive guardian of the District of Columbia; and as the Federal Legislature of twenty-four States, the Congress of the Union may well invite the public co-operation in a work of unrivalled local, as well as national utility.

"Among the proprietors, who look to its execution for an appreciation of the value of their landed property, the General Government is incomparably the largest. The value of this proprietary interest is to be computed in reference, not only to the extensive property of the United States, consisting originally of a moiety, and still of a great portion of the city of Washington, but to that vast unappropriated domain beyond the Alleghany, which still looks to emigration to people and improve it, and from the sale of which an annual revenue of two millions of dollars is now anticipated.*

"By greatly cheapening the intercourse between the East and the West, the heavy expenditure which the emigrant now incurs, in a protracted journey over numerous mountains, will be converted into an additional fund for the purchase of public lands, and their value enhanced, by affording to the purchaser a new facility for reaching without hazard, both in peace and war, the improved markets of the Atlantic, with the diversified productions of his labor and industry.

"In regarding the actual condition of a part of those markets, a second interest is developed, accompanied by a high political obligation; that of the exclusive sovereign of a district of country, narrow, indeed, in dimensions, but embracing all the cities of the Potomac, and the district of country to which the proposed canal is to be immediately conducted. If it would be the interest of those cities, had they the pecuniary ability, to construct such a canal, at their exclusive cost, the Government which has confided to it the power of legislating for their benefit, cannot be insensible of the high obligation to promote that interest, which the acceptance of so solemn a trust necessarily implies. Not only the prosperity, but the future safety, of the people of this District puts up an urgent claim to the exercise of a sovereign authority entrusted to the Central Government of the United States, not for their benefit alone, but for the permanent advantage, security, and honor, of the entire Union. The District of Columbia is not bound to the Union as a State, but as the immediate subject of the Government of all the States. It is, in truth, the property of the whole Union; and whatever advances its prosperity, is of immediate importance to the general welfare of that Union. The exclusive legislation of Congress over the District of Columbia, combines both Federal and State authority; is a complete sovereignty, one and indivisible. Having such a power over the territory and people of the District, for the benefit of the Union, the Congress are invoked to its beneficent exercise, not only by all

* The United States now own 3,200 building lots in Washington, besides several hundred acres of public grounds, which, if this canal succeed, will be of immense value.

those considerations to which a State may appeal, in addressing its local Legislature, but by all those federal obligations to the States themselves, which are involved in the exclusive legislation of the General Government over the seat of its deliberations, and the political centre of its operations.

"If the Legislature of a single State might legitimately labor to attract to the bosom of its territory the vast and increasing commerce of the West, so may the Congress of the United States to the District of Columbia; and so they are, therefore, bound to do, if it be practicable. The extent of this obligation in relation to the construction of that channel which the Chesapeake and Ohio canal provides for accomplishing this object, is not to be measured, as has been sometimes suggested, by the relative proportion which the length of so much of this canal as will lie within the territory of the District, bears to its whole line, since such a ratio is not an adequate standard of the relative benefits to be derived from its completion, to the various portions of territory through which it must pass. Were this otherwise, the extensive States and remote Territories on the immediate banks of the Ohio and the Mississippi, or intersected by their numerous tributaries, would have their immeasurable interest in the execution of this great work expressed by the very small proportion which the single point that it proposes to touch at Pittsburg, bears to the whole line of continuous navigation which the canal will establish across the Alleghany, between the Atlantic and the numerous rivers of the West.

"The interest of a great market in that channel of trade, which draws to it the various productions of the industry of a vast empire, is to be measured by the entire profits of that trade; and, if the profits of the commerce of the West, or any considerable share of them, be assumed to be the measure of the interest of the District of Columbia, in the proposed canal, and to promote that interest be a duty of its exclusive Legislature, the subscription of a moiety of the stock of the canal is not more than commensurate with the obligations of the Federal Government to the people confided by the constitution to its provident care.

"Can this obligation be evaded, by limiting the extent of the United States subscription to this canal, by that portion of the public revenue derived from the people of the District of Columbia?

"That they are unrepresented, would furnish a fair ground of implication that they should be untaxed, under a Government owing its existence to the principle that taxation, without representation, is tyranny. But the people of the District are subject to the same species of taxation with all the citizens of the United States, under a system of revenue, which, founded on the consumption of foreign imports, precludes the application of any exact estimate of the amount of their contribution to the common Treasury. If greater precision were attainable, the committee are totally at a loss to conceive how it could warrant a conclusion at variance with that at which they have arrived.

In founding a durable work, its remote as well as proximate benefits are to be regarded; and what scale of measurement can determine the future extent of the population, wealth, and consequent consumption of the District of Columbia, if it shall become, as its great founder confidently anticipated, the emporium of the West?

The end of the delegation to the Federal Government of any power whatever over the District of Columbia, was simple, indivisible, and of

universal interest.* For the promotion of this end, the common Government may rightfully, and must, necessarily, command the common revenue of the Union. Whatever augments the wealth and population of the District, adds to the security of the seat of the Federal Government of all the States. The prosperity of the District and of the Union cannot, therefore, be severed. A neglect to promote, by all practicable and ordinary legal means, the welfare of a people who have no Government but that of the United States, would not be less dishonorable, than to decline the exercise of an acknowledged federal power, when manifestly required for the benefit of the American people. The power over this District, vested in Congress by the constitution, is, therefore, accompanied by obligations of high dignity, that can be surrendered, neglected, or abandoned, only by a dereliction of duty, little short of a violation of the letter, as well as of the spirit of the constitution itself.

"The memorialists appeal, moreover, to the relation of the Federal Government to the States, which it unites, in behalf of a work calculated to perpetuate to the American people, and their latest posterity, the blessings of peace, freedom, and independence: objects which, in themselves, can have no limit to their value; because, without them, all other advantages, public or private, national or individual, are precarious and fleeting. The expediency of providing for objects of such magnitude, can be bounded only by the extent of the public resources. And no provision, among the many internal improvements which solicit the favorable countenance and pecuniary aid of the Federal Government, can surpass, in this tendency, the Chesapeake and Ohio canal. Extended, as was originally contemplated by the memorialists, and is now found practicable, from the Chesapeake to Erie, by Pittsburg, it unites, by one unbroken line of navigation, the shortest that can be devised, the seat of the Government with the three great limits of the United States: the Atlantic Ocean, the Gulf of Mexico, and the great Northern lakes.

"No State of this Union; not one of its many markets; no branch of its industry, whether it speed the plough or spread the sail, or ply, at home, the shuttle or the hammer; whether its activity be exerted on land or sea, to the North or South, the East or West; is without an interest in the accomplishment of this national work.

"The committee deem it unnecessary further to enlarge upon a topic,

* Act of cession by the State of Virginia distinctly sets forth this end.

"SEC. 1. Whereas the equal and common benefits resulting from the administration of the General Government will be best diffused, and its operations become more prompt and certain, by establishing such a situation for the seat of the said Government, as will be most central and convenient to the citizens of the United States at large, having regard as well to population, extent of territory, and a free navigation to the Atlantic Ocean, through the Chesapeake bay, as to the most direct and ready communication with our fellow-citizens on the Western frontier: *And whereas* it appears to this Assembly, that a situation combining all the considerations and advantages before recited, may be had on the banks of the river Potomac, above tide water, in a country rich and fertile in soil, healthy and salubrious in climate, and abounding in all the necessaries and conveniences of life, where, in a location of ten miles square, if the wisdom of Congress shall so direct, the States of Pennsylvania, Maryland, and Virginia, may participate in such location:

"*Be it therefore enacted by the General Assembly*, That a tract of country, not exceeding ten miles square, or any lesser quantity, to be located within the limits of this State, and in any part thereof, as Congress may by law direct, shall be, and the same is hereby, forever ceded and relinquished to the Congress and Government of the United States, in full and absolute right, and exclusive jurisdiction, as well as of soil, as of persons residing, or to reside thereon, pursuant to the tenor and effect of the eighth section of the first article of the constitution of the Government of the United States."

which, if it claim the exercise of a constitutional authority, more questionable than either of those powers on which this report has hitherto relied to warrant the appropriation that it recommends, rests that claim, on the strongest ground, that can be presented to the General Government—in behalf of a canal, connecting the seat of its deliberations, and the source of its political action, with the remotest extremes of its wide-spread territory. A work which, in the number of interests which it has sought to harmonize, as well as in the complicated political agency which the charter to construct it required, illustrates, alike, the extent of its utility and the difficulty of its accomplishment, without the authority and aid of a common Government. Having been brought, by great preparatory labor, to its present condition, it awaits, for its future progress, the acquisition of adequate funds to commence its operations. And, for these, it relies, as must every similar undertaking, on the wisdom, enterprise, and resources of all the interests, national and local, public and individual, involved in its successful prosecution.

"Should the Government of the United States, however, regard as insufficient to warrant the aid which the committee have proposed, to the House of Representatives, to extend to this work, all those considerations arising from its relation to the national domain, to the prosperity of the District of Columbia, and to the welfare and safety of the Union, still there remains another ground, on which, to rest the expediency of the proposed subscription. For, although, according to the terms annexed to it in the bill reported by the committee, the profit to be derived from the canal, by the United States, is made contingent, and dependent on the prior profit, to a limited extent, of all other subscribers to the stock of the canal; yet the general views which have been presented, and those which a closer investigation will superadd, must induce a confident belief that the public Treasury, should its claim to profit be deferred for a time, will be ultimately reimbursed all that it is invited to advance, with ample interest.

"The committee, indeed, very confidently believe that, on the single article of coal, an estimate might be founded, sufficient, of itself, to assure a liberal profit on the entire cost of the eastern section of the Chesapeake and Ohio canal.

"The most profitable canals in England, are those that serve to distribute for consumption, this valuable fuel, which enters, as a necessary of life, into the price of all human labor, and constitutes the *primum mobile* of so many arts.

"In no part of that kingdom, however, nor in any region of the United States, east of the Alleghany, can it be drawn from its native beds at so little cost, as at the head of the Potomac navigation, where it is elevated in parallel strata, nearly horizontal, above the surface of the proposed canal, and will be adjacent to its banks, or form a part of them. Less than one cent a bushel, or twenty-eight cents the ton, will be required to load the boats, which transport it; four cents will pay for its transportation, in boats adapted to the canal, from the coal banks to tide water; and allowing five cents for the canal toll on each bushel, it can be sold, in the markets of the District, with a mercantile profit of twenty-five per cent., at twelve and a half cents the bushel, or very little more than one-third of its present cost, in domestic use.

"When, added to the other almost innumerable uses of this commodity, that application of it be regarded, which the same region of country

favors, (abounding, as it does, both in limestone and iron ore,) to the smelting and manufacture of iron, in all its branches, it is difficult to place any limits, but those which the charter of the Chesapeake and Ohio Canal Company annexes, to the future profits of its stock; and no doubt can exist but that the use of this canal, must always exceed in extent that of the canal, which connects the Hudson with Lake Erie.

"There can be no rivalship, however, between two canals, which, in whatever manner improved, will, at a period not remote, be totally inadequate to waft the boundless supplies, with which, the agriculture and the arts, the internal and foreign trade of an immense empire, will crowd their surface.

"The committee believe that the time is not far distant, when, if every drop of water that can be commanded for the supply of continuous canals across the elevated summits which divide the Eastern and Western waters, shall be brought into use, the whole quantity will not suffice to waft between them, the exchangeable surplus productions of the labor, enterprise, and capital, of the extensive territories on their borders.

"All local interests should learn from this suggestion, if founded in truth, that they have no cause for jealousy, and much for concord, in the great work of internal improvement, of which the Chesapeake and Ohio canal constitutes but a single, though an essential feature."

"They believe that the completion of the proposed canal, by augmenting the exports, and consequently the imports, of the United States, would bring in to the public Treasury an annual return, exceeding greatly the interest on the sum which the Government is invited to subscribe. That return will, also, increase in proportion as the canal is extended, or the payment of the annual instalments of this subscription proceeds. This will not be deemed too sanguine an estimate, when it is reflected that the freights, and commission, and insurance, as well as all other charges of exportation, are paid by the value of those imports which are chargeable, by the customs, with an average duty of not less than twenty-five per cent. If, therefore, an addition be made, by the proposed canal, to the amount of those exports, of but one-fifth in value of the sum subscribed by the United States, the duties on the correspondent imports from abroad, will annually return to the public Treasury more than five per cent. on the total sum subscribed. Such subscription, therefore, will accelerate, rather than retard, the payment of the public debt.

"Sums of money judiciously invested in canals, if they at first yield little profit, are, in truth, but loans, the principal of which is inviolably secure, and their rate of interest certain of speedy and constant augmentation. In the estimate of their probable returns, the commerce which they create, must be added to that which they merely facilitate.

"Subscriptions to the structure of canals may be founded on loans, therefore, without affording to posterity cause to complain; since their benefit descends unimpaired with the debt which they contract, the cheap price of the countless blessings which they diffuse."

MEMORIAL

Of the Chesapeake and Ohio Canal Company to the Congress of the United States—December 12, 1833.

Pursuant to a resolution of the stockholders of the Chesapeake and Ohio Canal Company, hereto attached, marked A, the President and Directors of said company beg leave respectfully to represent:

That this valuable and important undertaking is now in successful operation from the city of Washington to Harper's Ferry, in Virginia, and its advantages are speedily beginning to be felt and known to the inhabitants who reside along the line of its projection. A fertile and valuable region of country abounding in bread stuffs, and mineral and forest resources, is fast opening to commercial pursuit, and new avenues to industry and enterprise are unfolding themselves. Valuable materials, which for ages past have lain dormant on our shores and mountains, because of the forbidding expense of reaching a profitable market through this opened channel, must soon form an increased source of wealth, whereby to enrich its citizens, and to advance the general interests of the country.

Contracts have been entered into, and are in rapid progress towards completion, to a point beyond Williamsport, in Maryland, which are expected to be finished during the ensuing spring and summer, whereby a line of canal communication will be completed for more than one hundred miles west of the city of Washington.

Your memorialists are aware of the differences of opinion which exist in reference to the subject of internal improvement; they take leave, however, to say that, in the whole undertakings and plans, present and in prospect, none probably ought to be considered of higher national importance than the Chesapeake and Ohio canal: its importance may well entitle it to be considered a national work. Its tendency is to subdue obstacles which nature has interposed, and, in interest and feeling, to unite those who in these respects are strangers to each other; thus to draw in closer ties the bonds of our Union.

Such may be the result of completing this canal to the Western waters; but, if this be an anticipation too flattering to be entertained, it is not unreasonable to say that the advantages in prospect should stimulate the parties interested to press forward its completion to the base of the Alleghany mountains, that the country may have the benefit of the many valuable materials which, even there, may be found. Timber useful to our navy and to other important purposes; valuable cements; all kinds of bread stuffs; iron ore and inexhaustible beds of coal, lie on the range and course of this canal. If the Government of the United States shall never receive any dividend from their funds invested in this enterprise, their gain will nevertheless be great in the cheapness of living which will be afforded to the citizens of their capital, and the increased strength which it must necessarily afford to the Union. Preserve this, we should, at any sacrifice; and surely that is preferable which shall tend to bring us to a knowledge of the wants and necessities of each other, in virtue of those principles which the constitution of the country recognises.

It is not for us to argue and urge the necessity and importance of constructing and finishing this projected work; that is a subject which belongs to those whose right it is to inquire, and who are abundantly competent to decide. A large amount of public and private capital has already been expended in this enterprise, most of which must be lost if it now fail.

Entire success can only be expected from the liberality of Congress, Virginia, and Maryland, who are in interest, and the desire they may entertain to further a work which, fairly considered, promises to be of great public utility. Individual enterprise is incompetent to so great an undertaking, and yet there are persons who, to promote it, have in a spirit of liberality already embarked their fortunes beyond half a million of dollars. From the depreciated state of the stock, arising from a distrust of its final completion, any further private subscription is not to be expected.

The question for consideration is, shall the canal progress, or be arrested? The aid which Congress may afford, will at once answer the question. It is believed to be a work without the scope of the President's objections as to the subject of internal improvement, and one which Washington, the father of his country, was known fondly to cherish. It is important in a commercial point of view, and, being completed, cannot fail more strongly to unite the eastern and western sections of our country, and thus strengthen the Union. Whether a work thus defended and sustained by the highest considerations which should influence patriots and statesmen shall progress, is for Congress and the Executive to determine. The submission is made with entire confidence to their discretion and judgment.

It has been said, and often repeated, that this republic was becoming too mighty, and that ultimately it must sink and be destroyed by its own pressure. It may turn out to be true, but if true, to no cause will it be more ascribable than to a want of proper facilities to a free and friendly intercourse with each other, whereby the people of these States may be rendered one in feeling, and identical in interest. They should be so rendered, for let them become disunited in the great concerns which interest creates, and those ties which now connect and bind may be lost and destroyed. The social compact would never have been entered into, if it had not become necessary that the weak should be protected from that power which ever belongs to the strong. Make the parts of a community dependent on each, and affection and kind feeling will be the sure and inevitable result; disregard it, and schisms, and strife, and difficulties must and will arise to disturb our quiet, and interrupt our repose.

In 1828 the canal was commenced with a fund adequate to all the purposes of a beginning, but, in the opinion of none, sufficient for the completion of so great an undertaking as the connecting of the Eastern and Western waters. No one could have been so weak in thought or in calculation as to believe that without a liberal support from the Government the scheme could ever be effected. It was of immediate concern to some of the States of this Union; Virginia, Pennsylvania, and Maryland were directly, and the whole of the Western States eventually, interested. This city, the metropolis of the Union, is also materially and directly concerned, and upon its success her resources and credit have been risked. In the same adventure the corporations of Alexandria and Georgetown, and the citizens of the District, have liberally embarked their means and placed their hopes.

The stock subscribed was 38,584 shares of one hundred dollars each, distributed as follows:

	Shares.	
United States - - -	10,000 -	$1,000,000
State of Virginia - - -	2,500 -	250,000
State of Maryland - -	5,000 -	500,000
Corporation of Washington -	10,000 -	1,000,000
Corporation of Alexandria -	2,500 -	250,000
Corporation of Georgetown -	2,500 -	250,000
Private subscription - -	6,084 -	608,400
	38,584	$3,858,400
To which add tolls received, and which have been applied to the construction of the canal - - -		93,552
Making the entire funds to be - - - -		$3,951,952
Of which amount there was expended up to the 1st of the present month of December, 1833, - - -		3,333,952
Leaving on hand, applicable to contracts not finished, a balance of - - - - - -		618,000
From which, deducting on account of supposed insolvencies of individual stockholders, - - - -		100,000

and there will remain at the disposal of the company for the further progress of the work about half a million of dollars. Of this, two hundred and eighteen thousand are in six per cent. Washington city and Georgetown stocks, redeemable next July, and which, owing to the present pressure in the money market, are not at this time available to the company at par value. For the same reason, payments from individuals cannot be enforced, without occasioning much embarrassment and distress to subscribers. These facts are stated to show the necessity of early action on the part of the Government, if it be their pleasure that the work shall further progress.

In pursuance of another resolution, marked B, your memorialists beg leave further to represent that a portion of the stock subscribed remains unpaid; some of those who became subscribers have removed themselves from this section of the country, others are unable to pay, and to attempt to coerce them would only occasion litigation and expense to the company. In many instances but a single dollar has been paid on the subscription. It is proposed, therefore, that the President and Directors have authority granted to them, on giving three months' previous notice in some newspaper, to declare every subscription forfeited to the company where $50 have not been paid on each share.

All of which is submitted for consideration.

By order of the stockholders and Directors of the Chesapeake and Ohio Canal Company:

JOHN H. EATON,
President Ches. and Ohio Canal Co.

December 13, 1833.

Resolutions of the stockholders of the Chesapeake and Ohio Canal Company, referred to under reference

A.

"*Resolved*, That the President and Directors of the Chesapeake and Ohio Canal Company be, and they are hereby, instructed to make application to the Congress of the United States, and to the Legislatures of the States of Maryland and Virginia, for additional subscriptions to the capital stock of said company, and that they memorialize the Legislature of Pennsylvania to co-operate with them."

J. P. VAN NESS,
Chairman of said meeting.

B.

"*Resolved*, That the President and Directors of the Chesapeake and Ohio Canal Company be authorized to ask for any alteration of the charter that they may deem necessary, the President and three directors being present and concurring therein."

J. P. VAN NESS,
Chairman of said meeting.

At a meeting of the President and Directors of the Chesapeake and Ohio Canal Company, held on the 13th day of December, 1833, at which meeting there were present John H. Eaton, President, and William Gunton, Phineas Janney, and Walter Smith, it was unanimously

Resolved, That the amendment to the charter of the company, as proposed by the preceding memorial to the Congress of the United States, is deemed necessary.

Attest : JOHN P. INGLE,
Clerk of the Ches. and Ohio Canal Co.

Accompanying this memorial is a report from Captain William G. McNeill, of the United States engineer corps, made by order of the Secretary of War, and at the request of the Secretary of the Treasury. It exhibits fully, and in detail, the state, condition, and progress of the canal, and is, accordingly, presented for the inspection of Congress.

J. H. EATON.
President Ches. and Ohio Canal Co.

MEMORIAL

Of the President and Directors of the Baltimore and Ohio Railroad Company, in favor of a further subscription of stock to the Chesapeake and Ohio canal.

FEBRUARY 10, 1834.

To the honorable the Senate and House of Representatives of the Congress of the United States:

The memorial of the undersigned respectfully represents:

That your memorialists have watched with the deepest interest the commencement and progress of the Chesapeake and Ohio canal, as a great national enterprise, originating with the father of his country, and displaying more clearly as it advances, the enlightened sagacity and foresighted patriotism of its illustrious projector.

The claims of this noble work to the countenance and patronage of the General Government, have been so often urged, and your honorable bodies already possess, in so many authentic forms, the fullest and most detailed evidence of its practicability and advantages, that the undersigned will not venture to repeat the arguments, or to spread anew before you the facts, which carried conviction to the minds of your predecessors, and the force of which time has only served to strengthen and confirm. But they would respectfully point to the present auspicious era, as offering a new impulse, and supplying an additional motive to the further and vigorous interposition of Congress.

The national debt is discharged. That cherished object—of deep and absorbing interest to the whole country, not only in reference to a just feeling of security and independence, but to the character and practical working of our republican institutions—has been accomplished. We are rid of the accumulated charges of two costly wars witnessed by the same generation. We transmit no burden to posterity to clog its rich inheritance; and, surely, at this moment of complete disengagement from pecuniary solicitude, when the great object of inquiry is as to the least mischievous plan for employing a redundant revenue, we do not err in asking you to give back to the nation, in the shape of a diffusive blessing, a portion of what has been confided to your disposal.

The objection, urged with success, to solicitations in reference to improvements of a local, limited range and usefulness, will not be pretended to be applicable here. There is nothing in this enterprise of a narrow, sectional character; in it mingle freely the sympathies and interests, as do the waters of the East and the West. Nor will it fail to occur to your honorable bodies, that the question is not an open one, of original investment, but that a large amount of money, under an appropriation by Congress, has already passed into the work, and must share its fate. Shall the past expenditure be lost to the country? There is nothing, as the undersigned conceive, in the history of the work, which can justify such infirmity of purpose, and rash abandonment of a great public stake.

Your memorialists would respectfully venture to suggest that the cha-

racter of the principal fund, which now flows into the Treasury with embarrassing profusion, may be considered as pointing to the proposed method of application. It is obvious that the impost at the custom-house ultimately presses with more severity on the consumer, who is furthest removed from the seaboard. The various agents of traffic, intermediate to consumption, take care to remunerate themselves liberally in the price of the article for every change to which it is subjected in its passage through their hands. There would seem, then, to be no more equitable arrangement than that the tax, which grows at each stage of transit, and carries its accumulated claim to reimbursement into the remotest cabin of the West, should be employed in alleviating the burden, by bringing the two great sections of our country together into close commercial contact.

The commonwealth of Pennsylvania, as well as Virginia, Maryland, and the United States, has taken an early, decided, and magnanimous part on this subject. Her own resources and credit are deeply pledged in the construction of works to which the one in question might, if viewed with narrow jealousy, be deemed a rival. She has not yet hesitated to raise her voice, and to exercise her influence in furthering a great national object. Her statute book presents the following resolution :

"*Resolved by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met*, That the Senators of this State in the United States Senate, and the Representatives of this State in Congress, are requested to endeavor to procure the passage of a law authorizing the subscription of a million of dollars, on the part of the General Government, to the stock of the Chesapeake and Ohio Canal Company, to be expended on the western section."

The undersigned respectfully ask that this appeal may now be listened to, when our financial condition no longer requires that the urgent claims of a just, wise, and comprehensive national spirit should be slighted or postponed ; and they are further encouraged to hope that it may be successful, from the consideration that this is an object eminently "*national*, and *partly completed*," and of course not affected by the objections urged against *new* and *local* objects ; besides, it is not an original but a further investment of funds, to save and render productive four millions of dollars already expended, one-fourth thereof belonging to the United States, which without this further aid must be lost to the country, with all the rich fruits, the benefits and blessings of this great national enterprise, destined not only to facilitate and cheapen the commercial and social intercourse between the Atlantic and Western States, but bind them together in a bond of perpetual union, thereby consummating the last and favorite object of Washington, the father of his country.

P. E. THOMAS.
SAML. SPRIGG.
R. B. MAGRUDER.
ALEXANDER FRIDGE.
ALEXANDER BROWN.
WM. STEUART.
JOHN McKIM, Jr.
J. LUCAS, Jr.
J. SWAN.
EVAN T. ELLICOTT.
AMOS A. WILLIAMS.
H. W. EVANS.
WM. PATTERSON.
JNO. J. DONALDSON.
ROBERT OLIVER.
GEO. HOFFMAN.

G. BROWN,
Treas. B. and O. R. R. C.

BY THE HOUSE OF DELEGATES.

March 11, 1834.

Whereas the Legislature and people of Maryland feel a deep interest in, and anxiously desire the early completion of the Chesapeake and Ohio canal; and whereas the immense advantages in trade and commerce to result from the completion of that work to the whole people of the West, as well as the middle portion of the Atlantic seaboard, to say nothing of the inestimable value, as the strongest ligament and firm bond of our Union, give to it, emphatically, a national character, and claim for it the liberal patronage of the General Government: Therefore,

Resolved by the General Assembly of Maryland, That the Senators of this State in the Congress of the United States be instructed, and the Representatives requested, to use their best exertions to obtain from Congress, at its present session, such a liberal appropriation of the public funds in aid of the further construction of the Chesapeake and Ohio canal, as shall ensure its completion.

Resolved, That the Governor be, and he is hereby, requested to cause a copy of these resolutions to be transmitted forthwith to each of our Senators and Representatives in the Congress of the United States.

We certify that the aforegoing is a true copy of the original resolution, passed by both branches of the Legislature at December session, 1833.

Given under our hands this 13th day of March, 1834.

LOUIS GASSAWAY,
Clerk House of Delegates, Maryland.
JOS. H. NICHOLSON,
Clerk Senate, Maryland.

ERRATUM.

Page 30, line 10 from top, for "$350,000," read $360,000.

APPENDIX.

A.

The first public meeting for the formation of the Chesapeake and Ohio Canal Convention was held in Leesburg, in Virginia, and the following is an extract of its proceedings from the 910th number of the Washingtonian:

Resolution of the citizens of Loudoun county, Virginia, adopted at Leesburg, August 25, 1823.

At a meeting of a number of the citizens of Loudoun, at the court-house in the town of Leesburg, on the 25th of August, 1823, John Rose, Esq. was called to the chair, and Robert Braden appointed Secretary.

The following preamble and resolutions were unanimously adopted:

Whereas the improvement of the navigation of the river Potomac, by a canal from the seat of Government to the great Cumberland road, to be thence extended, as soon as practicable, so as to meet a similar canal from the head of the steamboat navigation of the nearest Western water, is an object of inestimable importance, not only to the several States through whose territory the contemplated canal may pass, but to the commercial and political prosperity of the United States in general: Be it therefore recommended to the citizens of the several counties and corporations disposed to co-operate in the promotion of the above object, in order to devise some practical scheme for its certain and speedy accomplishment, to elect respectively two or more delegates to represent them in a general meeting to be held in the city of Washington, on Thursday, the sixth day of November next.

Resolved, That Charles F. Mercer, William T. T. Mason, William Ellzey, William M. McCarty, William Chilton, and R. H. Henderson, Esquires, be appointed delegates to act in behalf of this meeting for the preceding purpose, and that they be requested to invite in aid of it the co-operation of the citizens of such other portions of the United States as may be disposed to unite in sending delegates to the said meeting.

Resolved, That the delegates so elected shall be empowered in behalf of this meeting to concur in suitable memorials in favor of the proposed canal, to the Legislatures of the several States, and to the Congress of the United States.

JOHN ROSE, *Chairman.*

ROBERT BRADEN, *Secretary.*

The first county in Virginia which co-operated with Loudoun was Prince William, the proceedings of which here follow, and manifest very distinctly the views which prompted the early friends of the common enterprise.

PRINCE WILLIAM COUNTY, VA.

At a numerous and respectable meeting of the inhabitants of Prince William county, convened at the court-house of said county on Monday, the

6th day of October, (being court day for that county,) to take into consideration the appointment of such delegates as have been, or may be, appointed by the various sections of this and the adjoining States, interested in the improvement of the navigation of the Potomac river, Charles Ewell, sen. was called to the chair, and John Gibson, jr. appointed Secretary.

The object of the meeting being explained, the following preamble and resolutions were unanimously adopted:

Whereas our fellow-citizens of Loudoun have invited the county of Prince William to elect delegates to a public meeting, to be held in the city of Washington on the 6th day of November next, for the purpose of devising means to connect the waters of the Potomac and Ohio rivers; and whereas such a connexion would not only tend to improve very greatly the markets of the Potomac, but, by facilitating the intercourse of the Atlantic and Western States, operate as a powerful cement of that Union to which we, in common with the citizens of the United States, owe such distinguished blessings:

Be it, therefore, resolved, That John Gibson, jr., John Macrae, William Hebb, John Hooe, jr., Redman Foster, and Walter Harrison, be appointed delegates, in behalf of this county, to attend the public meeting advertised to be held in the city of Washington on the 6th day of November next.

And be it further resolved, That the proceedings of this meeting be forwarded for publication in the several papers printed in the District of Columbia.

CHARLES EWELL, Sen., *Chairman.*

JOHN GIBSON, Jr., *Secretary.*

B.

PROCEEDINGS

Of the Chesapeake and Ohio Canal Convention, which assembled in the Capitol of the United States, in the city of Washington, on the 6th day of November, 1823, *and reassembled in the same city on the 6th day of December,* 1826.

FIRST SESSION.

THURSDAY, *the 6th day of November, A. D.* 1823.

Delegates chosen by the people of various counties in the States of Virginia, Maryland, Pennsylvania, and Ohio, and by the several corporations and other interests of the District of Columbia, assembled in the Capitol, in the city of Washington, as a convention, to take into consideration the practicability and expediency of uniting, by a canal navigation, the waters of the Chesapeake bay with those of the river Ohio, and to devise ways and means to effect that object.

At 12 o'clock, on motion of Mr. Mercer, General Walter Jones, a delegate from the city of Washington, was unanimously appointed Secretary of the convention, and proceeded to make a roll of the members in attendance, and to call over their names; when the following appeared to be present by answering to their names:

FROM VIRGINIA.

Loudoun County.

Charles Fenton Mercer,
William Ellzey,
William M. McCarty,
William Chilton,
R. H. Henderson.

Prince William County.

William Hebb,
John Hooe, jr.

Frederick County.

Alfred H. Powell,
William B. Page,
James M. Mason,
William M. Barton,
Nathaniel Burwell.

Shenandoah County.

William Steinberger,
Benjamin Blackford.

Jefferson County.

Hiram L. Opie,
Braxton Davenport,
Henry S. Turner.

Berkley County.

Edward Colston,
Philip E. Pendleton,
Joel Ward,
William Short.

Hardy County.

John J. Vanmetre.

Shepherdstown.

William Butler,
Richard E. Byrd.

Harrison County.

Daniel Kincheloe.

Ohio County.

David Shannon,
David Shriver.

Fauquier County.

Berkley Ward,
Eppa Hunter,
John R. Wallace,
Henry Fitzhugh,
John Marshall, jr.

Fairfax County.

General Hunter.

FROM PENNSYLVANIA.

Uniontown.

James Shriver.

FROM MARYLAND.

City of Annapolis.

Jeremiah Hughes, Thomas H. Carroll.

Washington County.

Casper W. Wever, Thomas Kennedy,
Otho H. Williams, Frisby Tilghman.

Montgomery County.

Isaac Briggs, Johnson Hellen,
George Peter, Elisha W. Williams.
George C. Washington,

Fredericktown.

John McPherson.

Prince George's County.

John C. Herbert, Thomas Law.
Abraham Clark,

Charles County.

George Mason, Wilfred Manning.
Daniel Jenifer,

St. Mary's County.

James Forrest, Athanasius Fenwick.
G. N. Causin,

Alleghany County.

John McMahon.

DISTRICT OF COLUMBIA.

Washington City.

E. B. Caldwell,
John Davidson,
William W. Seaton,
Thomas Munroe,
Walter Jones,
Roger C. Weightman,
Thomas Carbery.

Washington County.

Nathan Luffborough,
Samuel H. Smith,
Thomas Corcoran.

Georgetown.

Col. John Cox,
Gen. John Mason,
Gen. Walter Smith,
Hon. John McLean,
John Laird.

Alexandria.

Thomas Swan,
Jonathan Swift,
Humphrey Peake,
Phineas Janney,
Robert I. Taylor,
Charles I. Catlett,
Jacob Morgan,
Amos Alexander.

By the landholders of the District of Columbia.

G. W. P. Custis.

When the list of names was *finished and corrected*, Mr. Mercer moved that seats should be reserved for honorary members.

This motion prevailed.

He then moved that Colonel Trimble, of Kentucky, be admitted as an honorary member.

The question was put from the chair, and carried unanimously.

On motion of Gen. Mason, Dr. William Howard, of Baltimore, was also admitted as an honorary member.

FRIDAY, *November* 7.

The convention met pursuant to adjournment.

The Secretary commenced the business of the day, and proceeded to call over the names of the members; when the following delegates, in addition to those in attendance yesterday, appeared, and took their seats:

From Morgan county, Va.—Messrs. Sherrard and Macky.

From Shenandoah county, Va.—Messrs. Carson and Overall.

From Preston county, Va.—Mr. George Hagan.

From Prince George's county, Md.—Messrs. Kent, Duvall, and Semmes.

From Montgomery county, Md.—Messrs. Wootten, Forrest, Kilgour, A. Lee, and Anderson.

From Charles county, Md.—Mr. Manning.

On motion of Mr. Mercer, Dr. Joseph Kent, of Prince George's county, Maryland, was unanimously appointed President of the convention.

Mr. Mercer then submitted the following preamble and resolutions:

Whereas a connexion of the Atlantic and Western waters by a canal leading from the seat of the General Government to the river Ohio, regarded as a local object, is one of the highest importance to the States immediately interested therein, and, considered in a national view, is of inestimable consequence to the future union, security, and happiness of the United States:

Resolved, That it is expedient to substitute, for the present defective navigation of the Potomac river, above tide water, a navigable canal, by Cumberland, to the coal banks at the eastern base of the Alleghany, and to extend such canal as soon thereafter as practicable to the highest constant steamboat navigation of the Monongahela or Ohio river:

That the most eligible mode of attaining this object will be by the incorporation of a joint stock company, empowered to cut the said canal through the territories of the United States, in the District of Columbia, and of the States of Virginia, Maryland, and Pennsylvania; and, therefore, that committees be appointed, each consisting of —— delegates, to prepare and present, in behalf of this assembly, suitable memorials to the Congress of the United States, and to the Legislatures of the several States before named, requesting their concurrence in the incorporation of such a company, and their cooperation, if necessary, in the subscription of funds for the completion of the said canal:

And whereas, by an act of the General Assembly of Virginia, which passed the 22d February, 1823, entitled "An act incorporating the Potomac Canal Company," the assent of that State, so far as the limits of her territory render it necessary, is already given to this *object*, and, for its enlargement to the extent required by the preceding resolution, the said act appears to furnish, with proper amendments, a sufficient basis: *Be it*, *therefore*, *resolved*, that it will be expedient to accept the same as a charter for the proposed company, with the following modifications, viz. that, in reference to its enlarged purpose, the name be changed to the "Union Canal:"

That provision be made for the assent of the Government of the United States and of the State of Pennsylvania to the said act, and that the act be made to correspond in its details with such provision:

That the Union canal shall be divided into two sections, eastern and western; the former of which shall correspond in description with that of the Potomac canal by the preamble of the said act; and the latter shall begin at the western extremity of the former, and terminate at the head of the steamboat navigation of the Monongahela or Ohio river:

That, while the act shall allow a reasonable time for the commencement and the completion of both sections of the canal, no other forfeiture shall be incurred, after the eastern section is finished, for a failure to begin or complete the western section within the term prescribed, except of the right to complete such section, and of all interest therein:

That, while the consent of Pennsylvania is provided for, in the amended act, it shall not be indispensably requisite to the validity of the charter, so far as respects the authority granted by it, to extend the Union canal to the Pennsylvania line:

That it will be both just and expedient, if not absolutely necessary, to limit the interest of the stockholders of the Potomac Company, in the stock of the Union canal, in the mode provided by the unanimous resolution of the company —— of the —— day of last ——, a copy of which is here annexed :

That the Union canal shall not, in width, be less at the surface than forty feet ; at its bottom, than twenty-eight, nor its depth be short of four feet :

That, in addition to the provision contained in the first section of the act aforesaid, there be grounded, on the event of its failure to furnish adequate funds for the completion of the eastern section of the canal, to be obtained through separate acts of the respective governments and corporations of the States of Maryland and Virginia, the Government of the United States, and the three cities of the District of Columbia, a subscription to the amount, if necessary, of 2,750,000 dollars, in the following proportions : 2-11ths by the State of Maryland, 3-11ths by the State of Virginia, 4-11ths by the United States, and 2-11ths by the District cities, to be divided between them, according to an equitable ratio, to be fixed by themselves :

That the Government of the United States be earnestly solicited to obtain the whole of this sum on loan, receivable in four annual instalments, upon the issue of certificates of stock, bearing an interest not exceeding five per cent. and irredeemable for thirty years, and to guaranty the repayment thereof on a specific pledge of the public lots in the city of Washington, of the United States stock in the canal, and the public faith :

That the first instalment of the loan be made payable on the 1st of March, 1825, and the last on the 1st of March, 1829 :

That the interest of each State and corporation, upon its proportion of the said loan, be paid into the Treasury of the United States, according to the terms of the loan, and the principal sum at the expiration of thirty years, the period to be fixed for its redemption :

That, in the event of a refusal by the Government of the United States to negotiate the said loan, each State and corporation shall provide the amount of its respective subscription, in such manner as may seem to it best :

That the maximum profit of the said company shall not exceed 15 per cent. after the entire canal shall have been completed ; but if, at any time after the completion of the eastern section thereof, and before sufficient funds shall have been otherwise provided for the completion of the western, the tolls of the canal shall yield a nett income to the stockholders, exceeding ten per cent. per annum, such excess shall be applied towards the extension of the canal, until the western section shall have been completed ; and to give more speedy effect to this provision, the President and Directors of the Union Canal Company shall be authorized to borrow, or may negotiate, through a suitable agency, in behalf of the company, on the credit of such excess, or on the tolls, or a fixed part thereof, levied upon certain commodities passing through the said canal, being the probable amount of such annual excess, such sums of money as may be deemed expedient, by a general meeting of the stockholders, to be applied to the extension of the western section of the canal, from time to time, till the said section shall have been completed. And if, after the completion of the entire canal, the nett dividends shall exceed 15 per cent. per annum, such

excess shall be applied, first to strengthening the works of the canal, next to the multiplication of ascending locks from the river Potomac to the level of the canal, wherever the convenience of the adjacent country may require it; next, to lining the canal throughout with such walls of stone as shall accommodate its banks to the use of steamboats; and should the nett dividends still exceed 15 per cent., then the excess shall be applied to the reduction, according to some equitable scale, of the tolls levied upon the said canal.

And be it further resolved, That a committee of —— delegates be appointed to prepare, and cause to be presented, in behalf of this assembly, a suitable memorial to the State of Ohio, soliciting the co-operation of that State in the completion of the Union canal, and its ultimate connexion with the navigation of Lake Erie; and that, for the latter purpose, the memorial shall respectfully suggest the expediency of causing the country, between the northernmost bend of the river Ohio and the southern shore of Lake Erie, together with the waters of Great Beaver and Cayuga creeks, and all other intervening waters near the said route, to be carefully surveyed, with the view of ascertaining the practicability and probable cost of a canal, which, fed by the latter, shall connect the former:

That a letter be addressed by the chairman of this assembly to the mayors of Alexandria, Georgetown, and Washington, apprising, through them, their respective corporations of the proceedings of this assembly, and inviting their zealous co-operation in giving to them effect:

That another letter be addressed by the chairman, in behalf of this assembly, to the President and Directors of the Potomac Company, requesting their concurrence in the measures recommended by the preceding resolution:

That the authority to levy tolls be varied so far as to authorize a toll, not exceeding three cents per bushel, per hundred miles, upon coal and salt, or five dollars per ton on iron, and the manufacture thereof, or three dollars per ton, per hundred miles, on all merchandise, or ten cents on the barrel of flour.

Resolved, That the committee before named be, and they are hereby, authorized and requested to use their best exertions to obtain the most favorable reception of their memorials, to ascertain and communicate to the Central Corresponding Committee, hereinafter named, such objections, if any, as are opposed to the prayers of their respective memorials, and to devise, if possible, in conjunction with the common friends of the union and prosperity of the United States, the means of obviating all the impediments to their success.

Resolved, That, for the last mentioned purpose, the delegates of the respective counties and corporations, represented in this assembly, be regarded as corresponding committees, and that —— persons be appointed a Central Committee of Correspondence to confer with the committees before named, and to hold stated meetings in the city of Washington, for the purpose of consulting upon, and adopting, in behalf of the Union canal, such measures as may seem best calculated to assure its certain and speedy accomplishment.

The resolutions having been read,

Mr. Mercer then moved that they be referred to a select committee; which was agreed to by the convention; and

Mr. Mercer, of Virginia,
Mr. Jones, of Washington city,
Mr. James Shriver, of Pennsylvania,
Mr. Colston, of Virginia,
Mr. Mason, of Georgetown,
Mr. Fenwick, of Maryland,
Mr. Herbert, of Maryland,
Mr. McLean, of Ohio, (residing in Georgetown, D. C.,)
Mr. Shannon, of Virginia,
Mr. Briggs, of Maryland,
Mr. Swan, of Alexandria,
Mr. Tilghman, of Maryland,
Mr. McPherson, of Maryland,
Mr. Opie, of Virginia,
Mr. Hughes, of Maryland,

were appointed the committee.

Mr. Colston moved that the committee to whom the resolutions have been referred, be instructed to inquire—

1st. Into the probable difference of expense between a canal 30 feet wide, and one 40 feet.

2d. Into the advantages and disadvantages likely to result from increasing the width of the proposed canal from 30 to 40 feet, and report the result of such inquiries to this meeting.

This motion was adopted by the convention.

On motion of Mr. Fenwick, it was

Resolved, That this meeting, and the friends of the Ohio and Chesapeake canal, generally, disclaim and disavow all opposition to any lateral canal which it is practicable to make, leading to or from the said canal, or to any future extension through any of the States adjacent thereto; that, on the contrary, they heartily approve, and are disposed to co-operate in every improvement in the navigation of the watercourses leading to or from the said canal, as tending to increase its general utility, and to enhance the profits of the undertakers thereof.

To the Chairman of the meeting of the friends of the Potomac canal, to be held in the city of Washington on the 6th of November next.

Sir: The undersigned having been, at a meeting of the citizens of Belmont county, Ohio, appointed delegates to the meeting of the friends of the Potomac canal, to be held in the city of Washington on the 6th of November next, are under the disagreeable necessity of saying that circumstances, beyond their control, place it out of their power to give their personal attendance upon that occasion. As a further apology for non-attendance, we subjoin a few remarks, intended to express the sentiments of our constituents upon the subject of your meeting.

In that section of Ohio which we have been chosen to represent, the thinking part of the population have for some time observed, with interesting anxiety, the movements of our Eastern brethren upon the subject of the Potomac and Ohio canal. They hailed with joy the first dawn of that liberal and enlightened policy which promised a speedy accomplishment of this great national work. Aware that their interests were closely blended with the completion of this design, they saw with real satisfaction the increasing excitement of that spirit which gave assurance that energy and efficiency would accompany the undertaking. With the utmost cheerfulness, then, they expressed an unqualified approbation of the measures which have been adopted to forward this great object, and their willingness to render a constant co-operation in future. At the county meeting, in which the undersigned were appointed delegates, the resolutions herewith forwarded were passed without a dissenting voice. It does

not, indeed, require much penetration to perceive that, if the projected canal is completed to Pittsburg, all that territory which is watered by the Ohio, and its tributaries, above the falls, will experience advantages which it is now impossible to estimate or conceive. It is confidently believed, by men who have examined the subject with attention, and who are well qualified to judge, that, if this canal be extended to lake Erie, it will enjoy a much more than equal participation of the trade of that Lake, as well as of Lakes Superior, Huron, Michigan, and their several extensive dependencies.

In the limits which we have prescribed to this communication, we cannot, nor do we think it necessary to assign our reasons for believing, with our fellow-citizens, that the Potomac and Ohio canal will be the outlet of all the trade of the Ohio, above the falls, and of the lakes west of its termination. As far as it regards ourselves, we are assured that, as we can afford to transport flour, bacon, tobacco, &c. to the Baltimore market, at an expense of from two to three dollars per hundred weight, we shall derive, proportionably, greater profit from the same trade when the cost of transportation will not exceed fifty cents. We anticipate, with great confidence, a considerable advance in the value of our lands, and, in general, of all our property, and particularly of such bulky commodities as will not now bear transportation to any safe market.

The same argument which proves the proposed canal to be fraught with benefit to us, may be applied, with little alteration, to all that country whose trade we have supposed will flow through its channel. The articles of our trade in general command as high a price in Baltimore as in New York. Why, then, go several hundred miles further to find a market at the latter place? Why incur the danger of meeting earlier obstructions from ice? Why brave the dangers of an extended lake navigation? These are considerations which cannot fail to have their weight with the Western people, in making choice of a market. A regard to our interest, on subjects of this kind, will be the sole guide of our decision.

With our best wishes, and those of our fellow-citizens, for the promotion of the object of your meeting, we have the honor to be,

Very respectfully, yours,

BENJ. RUGGLES.
S. COLWELL.

St. Clairsville, *Belmont county, Ohio, October* 27, 1823.

There were then presented to the meeting the proceedings of the citizens of Preston county, in Virginia, relative to the subject under consideration.

A letter was then stated to have been received by General Mason, from one of his colleagues, Mr. F. S. Key, who was prevented by sickness from attending, and another from 30 or 40 citizens at Cumberland Cove, impressing the necessity and utility of carrying the canal above Cumberland.

Saturday, *November* 8.

The convention met, pursuant to adjournment, and the Secretary proceeded to call over the names of the members, when the following additional members appeared:

Prince George's county, Maryland.—William T. Wootton and Robert W. Bowie.

Charles county.—John G. Chapman.

Frederick county.—Grafton Duvall.

Georgetown.—Clement Smith.

The following gentlemen were then admitted as honorary members, viz. Virgil Maxcy, of Annapolis; Major Roberdeau, of the Engineer Department; Mr. John Shriver, of Baltimore; the honorable George McDuffie, of South Carolina; and the honorable George Sullivan, of Boston.

Mr. Mercer presented resolutions of the citizens of the county of Monongahela, in Virginia, on the subject before the convention, and appointing a delegation.

Mr. Mercer then rose, and said that the committee to whom were referred the resolutions which he had the honor to submit to the convention, had, according to order, had them under consideration, with but a few hours' relaxation, ever since the adjournment of the convention. Indeed, they continued in session as late as twelve o'clock last night, and reassembled at sunrise this morning, in order to enable the convention to close their business, if such be their pleasure, to-day, the committee deeming it more expedient to rely on the labors of the central committee, than to protract the session of the convention to the great inconvenience of many of its members.

In relation to the instructions with which they were charged, respecting the breadth and depth of the proposed canal, they had commissioned the chairman to report verbally to the convention, that sufficient time had not been allowed them, to arrive at any very exact conclusion. Although they availed themselves of the aid of an experienced civil engineer, of their body, he had not the requisite leisure to furnish the required estimates to the committee, of the difference of the cost of two canals, one of the dimensions suggested in the instructions, and another of those recommended as the minimum breadth and depth of a suitable canal, for the great object contemplated by the convention.

The resolutions, with the amendments, were then successively put to the convention, and concurred in, and the chairman of the convention authorized to appoint the several committees referred to therein.

On motion of Mr. Herbert, it was

Resolved, unanimously, That the thanks of this convention be presented to the honorable Charles Fenton Mercer, for the zeal, ability, and industry with which he has assisted at its deliberations.

On motion of Mr. Powell, it was

Resolved, unanimously, That the thanks of this convention be given to the President and Secretary, for the ability with which they have discharged their respective duties.

And then the convention adjourned *sine die.*

The following are the resolutions as amended by the committee, and finally passed by a unanimous vote of the convention.

Whereas a connexion of the Atlantic and Western waters, by a canal leading from the seat of the General Government to the river Ohio, regarded as a local object, is one of the highest importance to the States immediately interested therein, and, considered in a national view, is of inestimable consequence to the future union, security, and happiness of the United States:

1. *Resolved, unanimously,* That it is expedient to substitute for the

present defective navigation of the Potomac river above tide water, a navigable canal, by Cumberland to the mouth of Savage creek, at the eastern base of the Alleghany, and to extend such canal, as soon thereafter as practicable, to the highest constant steamboat navigation of the Monongahela or Ohio river:

That the most eligible mode of obtaining this object will be by the incorporation of a joint stock company, empowered to cut the said canal through the territory of the United States, in the District of Columbia, and of the States of Virginia, Maryland, and Pennsylvania; and, therefore, that committees be appointed, each consisting of five delegates, to prepare and present, in behalf of this assembly, and in co-operation with the central committee, hereinafter provided, suitable memorials to the Congress of the United States, and the Legislatures of the several States before named, requesting their concurrence in the incorporation of such a company, and their co-operation, if necessary, in the subscription of funds for the completion of the said canal:

And whereas, by an act of the General Assembly of Virginia, which passed the 22d February, 1823, entitled "An act incorporating the Potomac Canal Company," the assent of that State, so far as the limits of her territory render it necessary, is already given to this object, and for its enlargement, to the extent required by the preceding resolution, the said act appears to furnish, with proper amendments, a sufficient basis:

Be it therefore resolved, That it will be expedient to accept the same as a charter for the proposed company, with the following modifications, viz.

That, in reference to its enlarged purpose, the name be changed to "The Chesapeake and Ohio Canal:"

That provision be made for the assent of the Government of the United States, and of the State of Pennsylvania, to the said act, and that the act be made to correspond in its details with such provision:

That the Chesapeake and Ohio canal shall be divided into two sections, eastern and western; the former of which shall correspond in description with that of the Chesapeake and Ohio canal by the preceding resolution, and the latter shall begin at the western extremity of the former, and terminate at the head of the steamboat navigation of the Monongahela or Ohio river:

That, while the act shall allow a reasonable time for the commencement and the completion of both sections of the canal, no other forfeiture shall be incurred, after the eastern section is finished, for a failure to begin or complete the western section, within the term prescribed, except of the right to complete such section, and of all interest therein:

That, while the consent of Pennsylvania is provided for, in the amended act, it shall not be indispensably requisite to the validity of the charter, so far as respects the authority granted by it, to extend the Chesapeake and Ohio canal to the Pennsylvania line:

That it will be both just and expedient, if not absolutely necessary, to limit the interest of the stockholders of the Potomac Company, in the stock of the Chesapeake and Ohio canal, in the mode provided by the unanimous resolution of the company of the 7th day of February last, a copy of which is hereto annexed:

That the said canal shall not, in width, be less at the surface than 40 feet, at its bottom than 28, nor its depth of water be short of 4 feet, except where, from the nature of the ground, it may be necessary, for the

greater security of the banks of the canal, to reduce its breadth at its base to less than 28 feet:

That the maximum profit of the said company shall not exceed 15 per cent. after the entire canal shall have been completed; but if, at any time after the completion of the eastern section thereof, and before sufficient funds shall have been otherwise provided for the completion of the western, the tolls of the canal shall yield a nett income to the stockholders exceeding 10 per cent. per annum, such excess shall be applied towards the extension of the canal, until the western section shall have been completed; and, to give more speedy effect to this provision, the President and Directors of the Chesapeake and Ohio Canal Company shall be authorized to borrow, or may negotiate, through a suitable agency, in behalf of the company, on the credit of such excess, or on the tolls, or a fixed part thereof, levied upon certain commodities passing through the said canal, being the probable amount of such annual excess, such sums of money as may be deemed expedient, by a general meeting of the stockholders, to be applied to the extension of the western section of the canal, from time to time, till the said section shall have been completed. And if, after the completion of the entire canal, the nett dividends shall exceed 15 per cent. per annum, such excess shall be applied, first, to strengthening the works of the canal; next, to the multiplication of ascending locks from the river Potomac to the level of the canal, wherever the convenience of the adjacent country may require it; next, to lining the canal throughout with such walls of stone as shall accommodate its banks to the use of steamboats; and should the nett dividends still exceed 15 per cent., then such excess shall be applied to the reduction of the tolls upon the said canal, according to some equitable scale.

That the act aforesaid be amended, by inserting, in lieu of the 18th section thereof, the following:

"*And be it further enacted*, That the right to the waters of the river Potomac, for the purpose of any lateral canal or canals, which the State of Virginia or Maryland may authorize to be made, in connexion with the said canal, is reserved to the States respectively: That a similar right is reserved to the State of Pennsylvania, in relation to the rivers and streams within the territory of that State, the waters of which may be used in supplying the western section of the said canal: That the Government of the United States shall retain the power to extend the said canal in or through the District of Columbia, on either or both sides of the river Potomac. And the State of Maryland or Virginia shall be empowered, under the sanction given by the United States to this act, to authorize any such extension, for the purpose of meeting any canal, so extended, by any other canal, which either State may deem it expedient to conduct, in any direction whatever, through its territory:

"*Provided, however*, That no part of the waters of the river Potomac, or of any other river or stream, required to ensure the constant, safe, and convenient use of the navigation of the canal hereby authorized to be made, shall be, by any such lateral or continued canal, diverted therefrom to the impediment or injury of the said navigation."

2. *And be it further resolved*, That, in addition to the provision contained in the first section of the act aforesaid, there be grounded, on the event of its failure to furnish adequate funds for the completion of the eastern section of the canal, to be obtained through separate acts of the respective governments and corporations of the States of Maryland

and Virginia, of the United States, and of the three cities of the District of Columbia, a subscription to the amount, if necessary, of $2,750,000, in the following proportions: 2-11ths to be subscribed by the State of Maryland, 3-11ths by the State of Virginia, 4-11ths by the United States, and 2-11ths by the District cities, to be divided between them according to an equitable ratio to be fixed by themselves. In case a part of the sum aforesaid shall be subscribed by private individuals, in the mode provided by the act aforesaid, the several States and corporations, within which such individual subscriptions are received, shall be requested to assume, as part of their aforesaid quotas, the amount of such subscription, under such security as they may deem expedient for the payment thereof, by the subscribers, to them respectively:

That the Government of the United States be earnestly solicited to obtain the whole of this sum on loan, receivable in four annual instalments, upon the issue of certificates of stock, bearing an annual interest not exceeding five per cent., and irredeemable for thirty years, and to guaranty the repayment thereof on a specific pledge of the public lots in the city of Washington, of the United States stock in the canal, and the public faith:

That the first instalment of the loan be made payable on the 1st of March, 1825, and the last on the 1st of March, 1829:

That the interest of each State and corporation, upon its proportion of the said loan, be paid into the Treasury of the United States, according to the terms of the loan, and the principal sum at the expiration of thirty years, the period to be fixed for its redemption:

That, in the event of a refusal by the Government of the United States to negotiate the said loan, each State and corporation shall provide the amount of its respective subscription, in such manner as may seem to it best.

3. *And be it further resolved*, That a committee of five delegates be appointed to prepare, and cause to be presented, in behalf of this convention, a suitable memorial to the State of Ohio, soliciting the co-operation of that State in the completion of the Chesapeake and Ohio canal, and its ultimate connexion with the navigation of Lake Erie; and that, for the latter purpose, the memorial shall respectfully suggest the expediency of causing the country between the northernmost bend of the river Ohio, and the southern shore of Lake Erie, together with the waters of Great Beaver and Cayuga creeks, and all other intervening waters near the said route, to be carefully surveyed, with the view of ascertaining the practicability and probable cost of a canal which, fed by the latter, shall connect the former:

That a letter be addressed, by the chairman of the convention to the mayors of Alexandria, Georgetown, and Washington, apprising, through them, their respective corporations of the proceedings of this convention, and inviting their zealous co-operation in giving to them effect:

That another letter be addressed by the chairman, in behalf of this convention, to the President and Directors of the Potomac Company, requesting their concurrence in the measures recommended by the preceding resolutions.

4. *And be it further resolved*, That the committees before named be, and they are hereby, authorized and requested to use their best exertions to obtain the most favorable reception for their memorials, to ascertain and

communicate to the central corresponding committee hereinafter named such objections, if any, as are opposed to the prayers of their respective memorials, and to devise, if possible, in conjunction with the common friends of the union and prosperity of the United States, the means of obviating all the impediments to their success.

5. *And be it further resolved,* That, for the last mentioned purpose, the delegates of the respective counties and corporations, represented in this convention, be regarded also as corresponding committees, and that thirteen delegates be appointed a Central Committee of Correspondence, to confer with the committees before named, and to hold stated meetings in the city of Washington, for the purpose of consulting upon, and adopting, in behalf of the Chesapeake and Ohio canal, such measures as may seem best calculated to assure its certain and speedy completion.

JOSEPH KENT, *Chairman.*

WALTER JONES, *Secretary.*

The following committees were appointed by the Chairman :

Central Committee.—Charles F. Mercer, John Mason, Walter Jones, Thomas Swan, John McLean, William H. Fitzhugh, H. L. Opie, Alfred H. Powell, P. C. Pendleton, A. Fenwick, John Lee, Frisby Tilghman, Robert W. Bowie.

Committee for Virginia.—Philip C. Pendleton, H. L. Opie, J. C. Hunter, W. Ellzey, Nathaniel Burwell.

Committee for Pennsylvania.—James Shriver, James Shannon, John McMahon, Daniel Kincheloe, George Hagan.

Committee for Maryland.—Grafton Duvall, George Mason, of Charles county, T. Kennedy, J. C. Herbert, General James Forrest.

To memorialize Congress.—Walter Jones, John Mason, G. W. P. Custis, Robert I. Taylor, Samuel H. Smith.

Committee for Ohio.—John McLean, Walter Smith, Benjamin S. Forrest, Thomas Carbery, H. Peake.

PROCEEDINGS OF THE CONVENTION—SECOND SESSION.

WEDNESDAY, *December* 6, 1826.

The Chesapeake and Ohio Canal Convention assembled agreeably to adjournment and to public invitation, this day at 12 o'clock. The chair was resumed by Governor Kent, and Walter Jones continued to act as Secretary.

Mr. Powell nominated Jas. S. Crafts, of Pittsburg, as assistant Secretary, and he was unanimously appointed to, and accepted that office.

It was then stated that those who had acted as delegates at the former session of the convention, would be considered members of the present, and those who had not, were requested to hand in their names, and verify their powers.

The following is the roll of the delegates to the former, as well as the present session of the convention :

FROM VIRGINIA.

Fairfax County.

Present—

Fitzhugh, Wm. H.
Hunter, John C.
Moss, Wm.

Absent—

Moore, John
Moss, Thomas
Thompson, Robert T.

Fauquier County.

Chapman, S. F.
Fitzhugh, Henry
Marshall, John, jr.
McNish, Wm
Ward, Berkley.

Brent, Robert
Brooke, Frs. William
Clarkson, Hy. M.
Scott, John

Frederick County.

Barton, Wm. B.
Burwell, Nathaniel
Page, John W.
Page, Robert
Powell, Alfred H.

Mason, Jas. M.
Page, Wm. B.

Hampshire County.

Armstrong, Wm.

Donaldson, Wm.
Kercheval, Samuel, jr.
Naylor, Wm.
Sherrard, Robert.

Hardy County.

Seymour, Wm.
Vanmetre, Jacob J.

Williams, Mortimer D.

Jefferson County.

Davenport, Braxton
Opie, Hiram L.
Peter, John
Turner, Henry S.
Washington, Bushrod C.

Kennedy, Andrew
Morgan, Daniel

Loudoun County.

Mercer, Charles F.

Chilton, Wm.
Ellzey, Wm.
Henderson, R. H.
McCarty, Wm. M.

Monongahela County.

Present—	*Absent—*
Ray, Thomas P.	Dougherty, Jos. T.
Wilson, Alpheus P.	Evans, Nimrod
	Haymond, Thomas S.
	Morgan, Charles S.

Preston County.

McCoy, Wm.	Hagan, George.

Prince William County.

Hooe, John, jr.	Dade, W. A. G.
	Foster, Redmond
	Gibson, John
	Hebb, Wm.
	McCrea, John

Shenandoah County.

Steinberger, William	Allen, Robert
	Blackford, Benjamin
	Carson, William
	Overall, Isaac

Shepherdstown, Jefferson County.

Briscoe, John	Lucas, William
Harper, Charles	
Lucas, Edward	

FROM MARYLAND.

Alleghany County.

Hoye, John	Bruce, Upton
McHenry, John	Sprigg, M. C.
Pigman, B. S.	
Smith, Benjamin B.	
Smith, Samuel P.	

Annapolis City.

Carroll, Thos. H.
Claude, Dennis
Hughes, Jeremiah

Anne Arundel County.

Dorsey, N. of Lloyd	Estep, R.
Howard, Geo. of John E.	Gantt, C. L.
Maxcy, Virgil	Hall, T. W.
Snowden, T.	Marriott, W. H.
Williams, J. S.	Ridout, R.
	Stewart, C.
	Thomas, A.

Baltimore City.

Present—
Etting, Solomon
Howard, Benjamin C.
Lorman, William
McKim, Isaac
Patterson, Joseph W.
Thomas, Philip E.

Absent—
Ellicott, Thos.
Taney, Roger B.
Tiernan, Luke

Charles County.

Brawner, Henry
Brent, George
Diggs, Francis
Green, Alex.
Merrick, Wm. D.
Stonestreet, Nicholas

Barnes, John
Chapman, John G.
Jenifer, Daniel
Matthews, William

Frederick County.

Dixon, James
Duvall, Grafton
Hughes, Daniel
Johnson, Jas.
Lee, John
Motta, Lewis
McPherson, John
Nelson, John
Sappington, Thomas
Warfield, Henry R.

Schley, Fred. A.
Slingluff, Jesse
Tyler, Wm.

Montgomery County.

Brooke, Roger
Forrest, Benj. S.
Kilgour, Charles J.
Lee, Archibald
Magruder, Zadoc
Peter, George
Washington, George C.

Anderson, James W.
Gaither, Ephraim
Leach, Jesse
Williams, Elisha W.

Prince George's County.

Bowie, R. W.
Clarke, Abram
Duvall, E. B.
Forrest, Julius
Herbert, J. C.
Kent, Joseph
Law, Thomas
Semmes, George

Semmes, B. I.
Wootten, W. T.

St. Mary's County.

Present—	*Absent—*
Thomas, R.	Ashton, H.
	Causin, J. N.
	Combs, C.
	Gough, P.
	Leigh, G. S.
	Millard, E. J.
	Neale, R.
	Sewall, W.
	Scott, W. B.

Washington County.

Anderson, Franklin	Blackford, John
Boyd, Marmaduke W.	Brent, Thos. C.
Fitzhugh, Wm. Jr.	Buchanan, Thos.
Hedrick, George	Dall, John R.
Hitt, Samuel M.	Gabby, Wm.
Keller, Thos.	Schnebly, David
Kennedy, Thos.	
Reynolds, John	
Tilghman, Frisby	
Vanlear, Matthew S.	
Williams, Otho H.	

FROM PENNSYLVANIA.

Adams County.

Fuller, John L.	Stevens, Thaddeus
Wilson, James	

Alleghany County.

Adams, James
Breckenridge, Alex.
Crafts, James S.
Craig, Neville B.
Stevenson, Jas. S.
Stewart, R. T.

Beaver County.

Dicky, John	Mervin, Enoch
Marks, Wm.	
Moore, Robert	

Butler County.

Breden, John
Negley, John

Cumberland County.

Present—	*Absent—*
Alexander, Samuel	
Carothers, Andrew	
Reed, John	

Dauphin County.

Bailey. Joel	
Beecher, Jacob	
Grimshaw, William	
Harris, Robert	
Hummel, Valentine	

Fayette County.

Craft, George	
Dawson, John	
Stewart, Andrew	
Todd, James	
Trevor, Samuel	

Greene County.

Morris, Jos.	Slater, Isaac

Mercer County.

	Cunningham, Thos. S.
	Leech, John

Somerset County.

Forward, Chauncey	Williams, James
Morrison, Abraham	

Westmoreland County.

Alexander, John B.	
Foster, Alex. W.	
Plumer, George	
Wise, Jacob M.	

Washington County.

Baird, Thomas H.	
Lawrence, Jos.	
McGriffin, Thos.	
McKennan, Thos. M. T.	
Reed, Geo. W.	

From the convention representing the counties of Portage and Trumbull, Ohio; and Alleghany, Beaver, Butler, and Mercer, Pennsylvania.

Present—

Ayres, W., Pres. Convention
Sloan, John
Whittlesey, Elisha
Wright, John C.

Absent—

FROM OHIO.

Belmont County.

Ruggles, Benjamin

Colwell, Stephen

Columbiana County.

Malin, James S.
Sloan, John

Jefferson County.

Wright, John C.

DISTRICT OF COLUMBIA.

Alexandria City.

Janney, Phineas
Mason, Thompson F.
Peake, Humphrey
Smith, Hugh
Taylor, Robert I.
Vowel, John C.

Alexandria County, Levy Court of.

Morgan, Jacob

Alexandria County, Freeholders of.

Custis, George W. P.

Georgetown.

Bussard, Daniel
Corcoran, Thomas, jr.
Cox, John
Dunlop, James
Key, Francis S.
Laird, John
Mason, John
McLean, John
Smith, Clement
Smith, Walter
Worthington, Wm. M.

Washington City.

Present—	*Absent—*
Barbour, James	Davidson, John
Burch, Samuel	
Carbery, Thomas	
Clay, Henry	
Jones, Walter	
May, Frederick	
Munroe, Thomas	
Seaton, Wm. W.	
Weightman, Roger C.	

Washington County, Levy Court of.

Corcoran, Thomas	Luffborough, Nathan
Smith, Samuel H.	

Washington County, Freeholders of.

Porter, David

To Brig. Gen. GRATIOT, *Chief Engineer, U. S. A.*

SIR: In obedience to your orders of the 11th of May, we have made the examination of those parts of the Chesapeake and Ohio canal which are "completed and under construction," and have now the honor to report the result of our observations.

The first part of the work which we visited was the basin at Georgetown. This basin is formed by a dam thrown across the mouth of Rock creek, forming an extensive quay or landing place, one of its faces being on Rock creek, and the other on the Potomac river. The length of the quay on the Potomac face is one thousand and eighty feet; two hundred feet of which is occupied by a tumbling dam, for the delivery of the surplus water of this creek, and thirty-eight feet occupied by the tide-lock, leaving eight hundred and forty feet front on the Potomac river. Piles, each one foot in diameter, were driven throughout the whole extent of the river front, touching each other, and then at every three feet of the interior, to a distance of twelve feet, until they refused a pile driver of eleven hundred pounds. The whole of these piles were then connected by heavy timbers, bolted to the head of each pile, and this frame work was then united by a course of hewn timbers, fitting close to each other, and five inches thick, and well secured to the frame and piles. On the front of this pile work there is a well laid dry wall, twelve feet thick, and seven feet high, including the coping. Strong and frequent ties of timber, firmly connected with the pile work, are extended under the soil of the quay. Until these were affixed, a slight curving had been observed in a part of the wall, but, since that time, not the least indication of yielding is perceptible, nor do we think there is any just ground of fear for the durability of this part of the work. It stood without injury the unusual freshet of the river of the last spring, on the breaking up of the ice.

The width of the quay is one hundred and sixty feet, except at the city end, where it narrows to eighty feet. Sixty feet in width of the centre of this quay is intended for warehouses and stores, and the rest of the space is to be left open for streets and landing places.

A bridge is constructed over the head of the tumbling dam, connecting the Georgetown part with the city part of the quay. This bridge is of timber on piles—a simple, but substantial structure.

The inside of the quay, forming the Rock creek face, is protected by a well laid dry wall, surmounted by a stout hewn timber coping, bound to its place by tie timbers extending some distance into the soil. The whole of the space between these two fronts is already filled up with earth.

The walled face of the basin also extends upon both sides of Rock creek, to the second bridge, constituting an entire length of walling on the inside of the basin, of five thousand five hundred feet, (about three hundred feet of the wall is yet to be laid,) and enclosing an area of eight and one-quarter acres.

But the real extent of this basin is much greater, as the water of this creek, when raised by the dam at the quay, will be deep and navigable up nearly to Patterson's paper mill, and will extend over an area about twice as great as that included between the walls.

About six thousand cubic yards of earth yet remain to be removed from the space between the walled parts of the basin.

The communication between the basin and the river is effected by a tide lock resting upon piles. These piles are of one foot diameter, driven at every four feet, with a pile driver of eleven hundred pounds. After the piles are driven home, and cut to a uniform level, a heavy frame of square timber, bolted to the head of each pile, connects the whole of the piles together. Over this frame three courses of two inch plank are laid, alternately crossing each other, and the whole united by trenails to the frame and piles; and upon this prepared foundation the masonry of the lock is built. The inside and outside courses of the lock walls is range work, with hammered faces, of the Aquia creek freestone; the interior or backing of these walls is rubble work of granite. The range work is laid in hydraulic cement, and the whole of the interior of the wall is carefully grouted with cement at every range. The wall of the lock on the side next to the tumbling dam is twelve feet thick; that of the opposite side is eleven feet.

One end of one of the walls of this lock—the end next to the river of the upper wall—moved soon after it was built, and before the mortar had set, drawing the masonry out, but without breaking a stone, leaving an opening at the hollow quoin of about seven-eighths of an inch. It has not moved since that period; but, as it has not been used, this defective part has not as yet been exposed to the pressure of the water. We do not think it secure in its present condition, and it may probably be found necessary to reconstruct this end of the lock.

The canal communicates with the basin which we have just described, by means of a lock, being lock No. 1, of the canal line.

This is a stone lock, faced with the Aquia creek freestone, and has the appearance of a good piece of masonry. One end, however, of one of the side walls, the end which joins on to the basin, has, from a defect in the foundation, yielded at the hollow quoin, and left an opening of about one inch.

The chamber of this lock is 100 feet long by 15 feet wide, and it has a lift of 8 feet, but it has not yet been in use, and has, consequently, not yet been exposed to the pressure of the water. The masonry appears remarkably well, except at the defective end, of which we have just spoken, the durability of which we are disposed to doubt.*

Between this and the next lock, No. 2, there is a small pool, 100 feet long by 46 feet wide, and enclosed by a stone wall, generally well constructed, but at places there appears to have been too many small stones admitted. At the head of this pool a stone bridge has been thrown over the canal for the accommodation of Green street. The passage under the arch is as wide as a lock.

Lock No. 2 is immediately adjacent to this bridge. It is of the same kind of masonry, of the same dimensions, and on the same plan, as No. 1. There is no evidence whatever of yielding in any part of this lock, nor has it as yet been in use.

The pool between this lock and the next above it is also small, being 120 feet long by 46 feet wide. Its sides are secured by dry stone walls. There is a drain from the streets of the town into this pool. It would, of course, have cost more to have conducted this drain along the side of the canal until it could have discharged itself into the basin, but, considering the small size of the pool, and the quantity of deposite which will be washed from the street into this pool, we think it would have been a better course, notwithstanding the increased expense. But it should be added, that the water may be drawn off in about twenty minutes from the pool, and it may then be cleaned.

At the head of this pool there is another stone bridge similar to the last, for the accommodation of Washington street, and adjacent to this bridge is lock No. 3.

This lock is of the same dimensions, style of masonry, plan, and lift, as the locks previously noticed. There is another small pool between this and the next lock, 120 feet long by 46 feet wide, with its sides protected by a wall of dry masonry. There are stone steps on each side of these pools, conducting to their bottom; and, in relation to the size of the pools, it ought in justice to be remarked that the nature of the ground which they occupy does not admit of their being larger.

At the upper end of this last pool there is another stone bridge similar to the last, for the convenience of Jefferson street, and adjacent to this bridge is lock No. 4.

This is the last of the lift-locks in Georgetown, and is similar, in all respects, to those previously remarked upon. From this lock the canal maintains throughout the town a width of 46 feet, and a depth of 6 feet.

The next street crossed by the canal line is Congress street; for the accommodation of which, there is a stone bridge, with a span of 40 feet. All these bridges are very neat and substantial structures, faced with the freestone of Aquia creek, well laid, and with hammered faces. The locks are also faced with the same kind of stone, wrought in the same manner. We are disposed to think that neither the texture of this stone, nor its specific gravity, is of a kind to have encouraged its use in such structures, particularly in the locks; but in justice to the practised judgment of the engineer, we feel bound to add, that the locks above, (which have been in

* Since we examined this lock, we have been informed that the defective end has been taken down, and that it is to be rebuilt from the foundation.

use about a year,) and which are faced with the same kind of stone, stood the excessive and long-continued frosts of the last winter without the least injury.

Proceeding along the line of the canal, the next structure we encountered was the bridge for the accommodation of High street. The span of this is to be 54 feet. The abutments are partly completed, and the centering for the arch is erected, and as much of the work as is done is certainly of a very substantial character. From this bridge to the market-house, on the next street, the work is in active progress. A vast deal of rock was encountered between Congress and Market streets, the greater part of which has been already removed; about 3,000 cubic yards yet remain to be blasted between High and Market streets. As this part of the line passes through a densely settled part of the town, the blasting could not be pursued with as effective an activity as in other places, from the necessity of using small charges of powder.

The next street beyond High street is the one in which the market-house is erected. The canal passes under this house, and two substantial wooden bridges are built immediately on each side of it.

There is then a wooden bridge for the accommodation of Duck lane, and one for Frederick street.

The whole of the canal, which passes through the town, is to be revetted by a stone wall, the greater part of which is already built, and is a specimen of good work.

The first culvert on the line is the one for Market street run. It has a span of eight feet, and is well built.

At the upper end of Georgetown, the embankment of the canal is sustained by a strong dry stone wall on its outside. As the wall had shown some indications of yielding to the pressure of the earth, strong buttresses had been constructed to aid it. The water has not yet been let into this part of the canal, and the stability of the wall has not therefore been tested by this additional pressure. The canal, its bottom as well as embankment, for a great distance in its line on each side of this wall, has been carefully puddled.

The width of the canal up to Frederick street is forty-six feet, and its depth six; from this street it gradually widens to eighty feet, and increases in its depth to seven, which it maintains through the remaining part of this level up to lock No. 5. This increase in depth of one foot in a part of this level, appears to us a hazard to the embankments and culverts, not compensated by any adequate advantages.

College creek, which passes between the town and Mason's foundry, is admitted directly into the canal; but as its bed is much lower than the bottom of the canal, no bad effect can result from the deposite it will occasionally bring down.

This bed is thirty feet below that of the canal, and, when the latter is filled, this part of it will be exposed to a pressure of thirty-seven perpendicular feet of water. Considering this fact and its consequences, it might appear to an observer, as a better course, to have constructed a culvert for the delivery of this creek. It so appeared to us, but, on inquiry of the resident engineer, Mr. Purcell, he informed us that the subject had been carefully studied, and the soil examined to a great depth, and found treacherous and unsafe, and that, if a culvert had been constructed, its durability was very doubtful, and the cost would have been much greater than the method ultimately adopted of embanking over the pass, and admitting the creek into the canal.

There is a small wooden bridge over this creek for the accommodation of the public road, which occupies that side of the canal bank. It is sustained by two massive abutments of dry masonry, in which the stone appear to be remarkably well laid.

From this bridge up to Mason's foundry, the canal is still sustained on the river side by a high embankment, and its opposite side, on which the road passes, is revetted by a very fine perpendicular wall of dry masonry. At the foundry there is also a strong stone wall outside of, and sustaining, the embankment.

The second arched culvert is immediately at Mason's foundry, for the delivery of the foundry stream and for a roadway. The arch does not appear to have yielded at any place, but several of thering stones, which are of the Aquia creek stone, have broken or split off at their outer surfaces. The sheeting is of rubble work, and many of the stone for such work do not appear to have been well chosen. The use of a great deal of mortar is evident from the intrados of the arch, and it is also apparent in places that the beds of the sheeting stone are not sufficiently extensive.

We know it to be a common practice with builders in our country to use rubble stone for the sheeting stone of arches, but in cases with as great a span as this arch possesses, and in which the work has to support a canal, we doubt the propriety of the practice. Even in arches of a less span, where rubble stone sheeting is used, great care should be bestowed on the choice of the stone, and in laying it.

The water had been let in a few days before our visit, to a depth of three feet over this culvert, but had been drawn off the day before, in consequence of a slight breach in the embankment a short distance above. When we examined it, there were but two or three inches of water left upon it. It leaked, however, considerably, perhaps sufficiently to justify fears of its stability, when exposed to a full pressure of seven feet of water unless some precautionary measures be taken. There was no crack or rupture in the masonry, the leak was between the stones of the sheeting and of the upper abutment.*

The level is continued from lock No. 4, in Georgetown, to lock No. 5, near the Little falls, throughout a distance of about four miles. We have already spoken of as much of this level as extends up to the culvert at Mason's foundry, from which, up to lock No. 5, the great dimensions of the canal are preserved. The side of the canal next to the river is sustained by a heavy and high embankment, revetted at its base by a substantial stone slope wall wherever it is exposed to the action of the river, and the interior slope of this embankment is lined throughout nearly the whole of this distance by a stone wall, rising from the bottom of the embankment, and resting upon its slope. The opposite bank of the canal, over which the road to the Little falls passes, is sustained by a well constructed perpendicular wall wherever the road is immediately adjacent to the canal; and where it extends back a short distance, the bank is generally revetted by a slope wall.

Between the foundry culvert and lock No. 5, there are two or three places where small streams are let directly into the canal. We do not consider this a good plan. From the precipitous character, and the loose texture of the hills which are drained by these streams, the deposite from

*We have been informed, since our visit, that the puddle work over this culvert had cracked, from too long an exposure to the sun; that it is now repaired, and that the water is again over this culvert to a depth of three feet, and that it does not now leak.

them into the canal will be considerable, and a filling up in the form of bars or shoals must be a consequence.

When it is not considered advisable to construct culverts for such streams, we think some method should be adopted to catch the deposite before it arrives into the canal.

The stream of Ewell's powder mill passes under the canal by means of an arched culvert.

Culverts are not only advantageous for these immediate objects, but also to deliver the water from back drains, the formation of which, we believe, will be found necessary wherever the canal is located, at the base of this extensive range of hilly land.

Near the locks of the old canal, and which are within the distance heretofore stated, there is a roadway passing under the canal, for the convenience of the fish landing below the Little falls. This structure is an arched stone culvert, with a span of fifteen feet three inches. A full head of water has been upon it for about nine months, but no leak is visible, nor is there the slightest evidence of yielding. To all appearances, it is a well built and durable structure.

We omitted to mention that we first observed water in the canal, at a point about one mile above Mason's foundry, from which it is in actual use up to the Seneca feeder.

A short distance below lock No. 5 is a wooden bridge, thrown over the canal, for the accommodation of the public road to the Little falls bridge. This is sufficiently elevated above the level of the canal to admit of the passing of the packet boat without inconvenience to passengers upon its upper deck. The structure is simple but substantial, and the towing-path is extended under it by means of a small bridge, so that there is no necessity of freeing the horse from the towrope while passing it.

Lock No. 5 is the first on the portion of the canal now filled with water. At the foot of this lock a feeder is taken in from the Potomac. This feeder is a part of the old canal, and receives its water at about half a mile from the lock, and above it. A well constructed arched stone dam is here thrown across the river, to ensure a sufficient elevation and supply of water. There is an island in the river where this dam is situated. The entire length of the dam, when completed, will be seventeen hundred and fifty feet. The distance from the eastern shore of the river, to the island in the line of the dam, is eight hundred and fifty-five feet, which is the extent of the dam now constructed.

Lock No. 5 is similar in its plan, dimensions, and materials, to those we have before spoken of. It appears to have been faithfully built, and is very tight.

The great dimensions of the canal heretofore stated, terminate at this lock, beyond which the width at the water surface is sixty feet, and the depth six.

About twelve hundred feet above lock No. 5, is lock No. 6. The canal in this distance is judiciously located, and durably constructed. Lock No. 6 is similar to No. 5, and deserves the same commendation.

Between lock No. 6 and lock No. 7, the length of canal is about one mile and a half. In this distance, much of the embankment is exposed to the action of the river, against which it is, however, carefully protected by a well laid and substantially built stone wall, resting against the slope of the embankment, and rising to its top.

The use of Aquia creek freestone appears to have ceased at lock No. 6. Lock No. 7 is composed entirely of granite, and has the appearance of faithful workmanship and of great durability.

About half a mile above lock No. 7, is a fine arched stone culvert, for the passage of Cabin John creek. It has every appearance of being a faithfully executed piece of work, exhibiting not the slightest evidence of yielding or of leaking. It is one hundred and twelve feet long, the span or chord of the arch twenty-two, and its rise five feet. If any expression of regret might be indulged, in relation to this excellent structure, it would be that the span of the arch is not greater; its rise could not be from the level which was considered advantageous to preserve the canal which passes over it. It has in one instance not been found adequate to the free delivery of the water of the creek, which rose above the embankment, and flowed into the canal. The freshet to which we now allude, is believed to have been a very unusual one, and much increased by a simultaneous rise in the Potomac. The canal suffered no injury from the rise: but should this prove to be a property of this creek, of more frequent occurrence than is now anticipated, it may become advisable to construct another arched culvert near to the present one. We deem it, however, a duty to the engineer to add that this is one of those cases better to be known by experience than to have been readily anticipated.

From this culvert to lock No. 8, which is one mile and a half, the embankment of one side of the canal again touches the river, but is protected from its action by a strong and well laid stone wall, rising to the top of the embankment.

Lock No. 8 is of the same dimensions, plan, and lift, as those below. It is the first with which we have met, which has the facing, or front range of its walls, made with the red sandstone of Seneca creek. We consider this an excellent stone, and well adapted to the use to which it is applied; inferior, however, to granite. The quarries (as do all quarries) furnish stone of various qualities, and great attention should be bestowed on the choice of the pieces. We were informed that these are in all cases subjected to a rigid inspection before they are admitted into the work: those exposed to our view were evidently well chosen.

From lock No. 8 to lock No. 9, the length of canal is 1,440 feet. The embankment next to the river is here again revetted by a well laid and strong slope wall of stone, extending to its top, and the inside slope is also revetted in the same way. Between No. 8 and No. 9, there are two well made arched stone culverts.

Lock No. 9 is somewhat different from those below, being laid entirely in cement mortar, and not grouted in any part. It had leaked a little from the front of the walls, soon after it had been first used, but a careful pointing with cement had since entirely remedied this. We saw no leak whatever. This lock is built of granite, except the coping, which is of Aquia creek stone.

We have as yet made but few remarks on the method of building, as we mean to go into some details on this subject after we have completed a general itinerary of the line.

From No. 9 to lock No. 10, the length of canal is 300 feet. It has every appearance of having been well made.

Lock No. 10 is built entirely of granite. It is a fine structure, extremely tight, and has every appearance of durability. We take this opportunity

to remark, that all the locks previously noticed were also tight. We saw no leaking or spouting from the walls, and we examined them immediately after each was emptied, when such defects, if they exist, will always show themselves.

From No. 10 to lock No. 11, the length of canal is 600 feet. Near to lock No. 11, and between it and No. 10, there is a skewed arched culvert for the delivery of Rocky run. This culvert had yielded in some of its parts; but precautionary measures were immediately adopted, and it has since exhibited no indications of failing. It leaked rather too much in places, and we think it advisable to reconstruct the puddle work, from the base of the abutments, around the entire arch, where the leaks appear. Its length is 152 feet, the span of the arch 12, with a rise of 6.

Lock No. 11 has its front ranges of the Seneca stone, its backing of rubble granite. A small stone flume was being made around this lock to feed the lower level. This course is to be adopted for all the small pools.

From No. 11 to lock No. 12, the length of the canal is thirteen hundred and twenty feet, and is well made.

From No. 12 to No. 13 it is three hundred feet long, by seventy feet wide, and the same from No. 13 to lock No. 14. The engineer was constrained to have these small pools, from the peculiar character of the ground. The locks are well built, are entirely of granite, and of the same dimensions and plan as those previously noticed, except No. 13, which passes the water through the gates, and not by a culvert through the side walls.

The canal is now continued at the same level, without interruption, for about four miles, to lock No. 15. In this distance, a well built arched roadway passes under the canal. The whole of this level is well chosen, and the work well executed. The embankment, which frequently encroaches on the river, is protected by a well built slope wall of dry masonry, rising to its top, and occasionally forty feet in height. This wall is made unusually strong, not only to sustain the pressure to which it is exposed, but also because it was the most convenient and economical way of disposing of the vast quantities of stone which had to be blasted out of the path of the canal in its vicinity.

Lock No. 15 has the front ranges of its masonry faced with the red sandstone of Seneca. It is free from any leak, shows no yielding in any part, and appears to have been faithfully built.

The length of canal, from No. 15 to lock No. 16, is about two hundred and forty yards. No. 16 is similar in plan, materials, and mode of construction, to No. 15, and equally creditable to the builder in its appearance.

From No. 16 to lock No. 17, the distance is four hundred and twenty yards. Here, again, the embankment had to encroach upon the river, from the action of which it is protected by a heavy slope wall of stone, continued up to the top of the embankment, and in places it is as high as fifty-six feet. This wall had partially yielded to the great pressure to which it is exposed, but was immediately repaired and enlarged, and is also aided by strong and well built buttresses.

In these cases, where the wall is stated as being so high, rows of plank piling were driven on the inside, and the canal filled up with earth, and secured by a puddle work. Where the deep places widen into large ponds, as in the vicinity of Bear island, the inside of the embankment is judiciously and carefully secured by plank piling, and by a puddle wall.

Between No. 17 and lock No. 18, the canal is widened into a capacious

pool, at the upper end of which it receives a feeder from the Potomac. This pool is three hundred feet long by one hundred feet wide.

Between No. 18 and lock No. 19, the length of the canal is three thousand one hundred and ten feet, and is well executed. These last locks (except 19) are all similar to each other, and to those previously noticed. The fronts range work, with hammered faces, of the Seneca stone—the backing of rubble granite. And lock No. 19 differs from these only in its lift, which is nine feet.

From No. 19 to lock No. 20, the distance is four hundred feet.

This last lock has the general lift of the locks of this canal of eight feet, and completes the series necessary to surmount the elevation of the "Great falls" of the Potomac.

The line of the canal from the Little falls to this lock was replete with difficult passes, which the engineer appears to have attacked with boldness and intelligence, and to have admirably surmounted.

At this lock we found an excellent hotel, kept by Mr. Fenlon. The house is built upon the ground of the company, and with the company's funds, and is a necessary and great accommodation to those who visit this interesting work.

From lock No. 20 to No. 21, the length of the canal is two miles and a quarter. It is a carefully executed piece of work. The embankment, wherever exposed to the river, is protected from its action by a well constructed and substantial wall of dry masonry, and generally revetted also on the inside slope, by a wall rising from the bottom of the canal.

Between No. 20 and lock No. 21, there are two well constructed culverts, which appeared to be perfectly tight, and of an enduring character.

Lock No. 21 is similar to those previously noticed, and has all the appearances of faithful work, is tight, and exhibits no evidence of yielding.

There is an arched culvert near the head of this lock, in which we observed two or three places were it leaked. It appeared to require some attention.* There are also, between 21 and 22, two other small arched culverts, perfectly tight, and with every appearance of faithful workmanship. We observed also, in this distance, a paved ford, to accommodate the adjoining farms. This ford can be conveniently used when the water in the canal is about four feet deep; when deeper, it is contemplated to use a large boat at this place, for which purpose docks are constructed on each side of the canal, that the boat may lie out of the canal line. Within the limit before stated, there is also a culvert for the delivery of Watts's branch. This is a large arched culvert, and to all appearances well built. Not the least leaking was visible. Its length is one hundred and fifteen feet; the span or chord of the arch twenty, with a rise of ten feet. The length of canal line between locks 21 and 22 is three miles. Throughout the greater part of this distance, the embankment on the river side is sustained by a beautiful and well built sloping stone wall of dry masonry, resting upon a judiciously laid footing, and rising to the top of the embankment, the inside slope of which is revetted also with a slope wall, laid from the bottom of the canal. There is one continued line of two miles of this walling, curving with the canal, in which we did not observe the slightest indication of yielding or of weeping in any part of it. In parts of this line the rock excavation was

* We have since understood that it has experienced a slight breach, and is now undergoing a thorough repair. But in candor we must add, that we saw no sufficient grounds for apprehending any such disaster.

very great, and the superfluous stone is judiciously placed outside of the walling, and in a manner to relieve it from the current of the river.

Lock 22 has a lift of seven feet, but is in other respects similar to those which we had previously examined. Between this lock and No. 23 the length of the canal is three miles. It is a well executed piece of work, having much of its embankment protected from the river by a well laid stone wall, founded upon a broad footing.

A short distance beyond No. 22, there is a well made arched culvert for the delivery of Muddy branch. It rests upon a rock foundation, and shows no leak or evidence of yielding.

Lock No. 23 is the next which we examined, and the last in the extent of the canal, now filled and in active use, constituting, in its present condition, a distance of about twenty-one miles of canal navigation. We have already remarked upon the appearance and execution of the work thus far, and have spoken generally of the dry walling. We were particularly struck with the extent and excellence of this part of the work, and of the judicious collection in places of the superfluous stone, forming masses projecting into the river, and aiding to turn its current from the walls. But there were places where the superfluous stone were thrown indiscriminately over the wall, and allowed to take whatever course they would, covering the wall irregularly from its base. This had a very unfinished appearance, but it was the most economical disposition which could be made of the stone, and aids the wall in its resistance. The stone were thrown over in a manner to avoid injuring the wall; and where this method of disposing of the stone was observed, it was at places where any violent action of the river is not to be apprehended.

Lock No. 23 has a lift of eight and a half feet, and immediately adjacent to it is a guard and lift-lock No. 24, communicating with the Potomac river.

These two locks were laid throughout with the cement, or hydraulic mortar, and no grout was used. The facing, or front ranges of masonry, are of the red sandstone of Seneca. They had the appearance of faithful workmanship. We were informed that at one time a spouting of water had been observed from the side walls of these locks, immediately after being emptied; but we observed nothing of the kind when we examined them.

The canal is fed from the river through the guard and lift-lock No. 24. It is generally called the Seneca feeder. An arched stone dam, two thousand five hundred feet long, and adapted to raise the water six feet above low water mark, is here thrown across the river, and directs the water into the lock. The chamber of this lock is of the same size as that of the lift-lock. It is in active use in passing boats between the canal and the river, and bestows the advantages of the canal to the country on both shores.

The method of admitting the water into all the lift-locks we have passed, is, with one exception, by a walled well and culvert, constructed in the masonry of the side walls of the locks. The discharge into the lock-chamber is by three rectangular openings on each side of the locks, under the water and at the bottom of the lock. The opening into the well from the level above, is regulated by a cast iron paddle-gate, turning on a pivot.

This plan admits the water without violent ebullition, and avoids a forcing of the boat against the gates. We found it generally agreeable to the officers of the canal, but that the frequent breakings of the paddle-gates were subjects of complaint. This method, though often alluded to by

writers on these subjects, has not, we believe, been elsewhere so generally adopted, nor do we consider it as having any marked advantages over that now frequently followed, of having the upper gate to extend to the bottom of the lock, and of admitting the water through the lower part of the gate, by a common pivot-valve, or by a valve raised by rack-work.

The admitting of the water by a well and culvert, lessens the strength of the side walls, requires more care in workmen than is usually obtained, and a more vigilant inspection of the work. The passages are liable to be choked up by billets of wood and by stones; and the plan presents difficulties, and occasions great expenses, when repairs are required, while it at the same time exposes a greater surface to accidents. For ourselves, we think the more simple these structures are, and the more accessible to repair, the better.

The gates of the locks are tight, well made, and remarkably well hung. They fit to the hollow quoins with great exactness, are well balanced, and generally move with ease. We were particularly struck with the secure anchoring of the upper hinge. The irons extending well over the masonry, and being embedded and firmly bolted to it.

The usual time employed in the passing of a lock, by the packet-boat, is four minutes. A passage, however, may be readily effected in three minutes and a half, and we were informed that, in an experiment of several passages, the average of the time occupied was but three minutes.

We observed many well constructed waste-gates, but there appeared to us a singular deficiency of waste-weirs. We consider these last as necessary to the security of a canal, as they act of themselves, and discharge the superfluous water before it can rise so high as to overflow and injure the embankments.

We now proceeded to examine the work above the Seneca feeder. As the construction of this part of the canal is in progress, it afforded us an excellent opportunity of witnessing the excavations and the methods of building.

The trunk of the canal is excavated, and the embankment nearly finished, from the feeder (or from lock 23 of the canal line, which is the lift-lock adjacent to the feeder) to the Seneca river, a distance of about three-quarters of a mile.

Over this river an aqueduct is constructing. The abutments and piers, which rest upon a rock foundation, are completed, the centering is up, and the arches partly turned. The masonry is to be entirely of the red sandstone of Seneca.

The length of the aqueduct, from the face of one abutment to the face of the other, is one hundred and fourteen feet. It will consist of two piers and three arches. The span of each arch is thirty-three feet, and the thickness of each pier seven feet. The sheeting, as well as the ringstone, are to be cut to the proper angle, and the whole of the arch work is to be laid in cement, and grouted carefully over the extrados. The front or facing ranges of the piers and abutments are laid in cement or hydraulic mortar, and the interior of the masonry carefully grouted with cement at every range. No stretcher is admitted with a bed less than its face, and no face is less than a foot wide, and the length of each stretcher must be not less than four feet. No header is admitted that does not extend into the masonry at least four feet, and with a face one foot high and two feet long. The spandrells are to be built up with rubble stone, and grouted with cement at every range.

The stone, before being used, are subjected to a rigid inspection, and if an improper piece finds its way into the work, it is ordered out as soon as discovered.

The masonry of the lower abutment of the aqueduct is connected with a lift-lock, and the width of the canal over the aqueduct is the same as that of a lock chamber. This lock, No. 25, was also in progress.

We believe that this structure will be both beautiful and enduring, and that it presents the best method of passing the stream, even if its water should hereafter be wanted to feed the level between the aqueduct and lock 26.

From the aqueduct we passed along the excavated part of the canal to Horse-pen run. A culvert was constructing for the delivery of this run, the abutments of which are completed. The stone used are well selected and well laid. Another culvert, at a short distance above this, had its abutments partly raised.

We then continued our examination up to lock No. 26. This lock is eight miles beyond the Seneca aqueduct. Nearly the whole of the excavation in this distance is completed, the towpath formed, and the culverts in a state of active execution.

Lock No. 26 was nearly completed, the walls were up, and in want only of a part of the coping stone, which the workmen were then laying. The timber for the gates was also framed, and ready to be put together. The whole of this work had the appearance of faithful execution, and a judicious choice of materials.

A pivot-bridge is to be thrown over this lock, to accommodate the road to Edwards's ferry. This bridge was made, and ready to be placed upon the lock.

Near to the head of this lock, there is a well built arched culvert, for the passage of a small stream, and for the convenience of a back drain. The foundation of this is of timber, and so situated as to be always under water. Each end of the culvert is protected by a firmly driven series of plank piling, extending five feet below the foundation. The masonry is laid in hydraulic mortar, and then grouted, and the whole is to be covered by a puddle-work, which last yet remained to be completed.

About one mile beyond lock No. 26, there is constructing an arched stone culvert, for the delivery of Broad run. It will have a span of sixteen feet. The masonry of the abutments is completed, and ready to receive the skewbacks. The abutments appeared to be well laid, and the stone used equally well selected.

Broad run may be taken in as a feeder, at a point about three-quarters of a mile from the canal.

A short distance from the last, there is another culvert of six feet span, for the delivery of Abraham's branch, and soon again another of four feet span. This last is finished, and is a good piece of work.

At Hillary's farm, the pit for an arched roadway was dug out, and preparations were in activity for the construction of the work. About 500 feet further on, there is another arched culvert of six feet span, for the delivery of a small stream, and also to accommodate the back drains. This culvert was being built, and showed good work and well chosen stone.

One mile from the roadway at Hillary's farm, another arched roadway is in progress. The work was completed to the height of the abut-

ments, and is a fine specimen of masonry. The passage between the abutments is ten feet wide. The centering is to be erected and the arch completed immediately.

Three-quarters of a mile further a pit is excavated, and part of the foundation laid for another roadway, intended for the convenience of Conrad's ferry. As much of the masonry as is executed deserves commendation.

We cannot forbear here expressing our decided approbation of this method of crossing canal lines over the more usual method by bridges. Its many conveniences to those who use these roadways, as well as to the canal, should in all cases, give to them a preference, where the ground is adapted to their construction.

The next lock above is No. 27, and is eight miles from No. 26. We have already enumerated the works of masonry in this last distance, and have described the state of forwardness in which we found them. One or two small culverts for drains, completely finished, have escaped particular remark: we looked at them, however, and found them, to all appearances, well executed. The excavation of the canal trunk, and the formation of the towpath, were also well advanced. In fact, the earth to be removed appeared to us but little more than was necessary to form the embankments and the canal over the several works of masonry in progress, and we were informed that it was left for these purposes.

Lock No. 27. The pit of this lock was completely excavated, the foundation laid, and some of the masonry raised a few feet. The stone were well chosen, and the joints of the range work square and close. The work was progressing actively and in good faith.

We examined, at the same time, a quantity of stone brought for the use of this lock, and lying on the river bank. They were of the red sandstone of Seneca, and are remarkably fine pieces.

A short distance above this lock there is a skewed culvert constructing, for the passage of a small stream, and also to answer for a roadway. The abutments of this work are completed and ready for the skewbacks, and have every appearance of faithful work.

Mr. Cruger, the engineer for this part of the line, also showed us the ringstone prepared for this arch, and explained, in an intelligent and satisfactory manner, the principles on which they were cut.

About half a mile beyond this culvert there is another for the passage of a small stream. This, excepting a few ranges of the wing-walls, was completed, but not yet covered with earth, and was entirely exposed to our view. The work had a very enduring aspect, and every appearance of faithful execution.

The entire distance between the last lock and No. 28 is two miles; in which the excavation of the canal was also nearly completed.

Lock No. 28 is rather more advanced than No. 27, and shows similar evidence of faithfulness in its execution.

From No. 28 to the aqueduct over the Great Monocacy, is about half a mile. On this distance we passed the Little Monocacy, for the delivery of which a culvert is being made. The foundation is laid, and the walls of the abutments are nearly completed. The stone used in this work are fine, and it has every appearance of durability.

Between this and the aqueduct over the Great Monocacy, the canal is to be enlarged into a basin, 500 feet long by 100 feet wide.

It may be proper to remark that, in the whole length of the canal from the aqueduct over the Seneca to that over the Monocacy, wherever the embankment touches upon the river, it is carefully protected against its action by extensive and well constructed walls of dry masonry.

These walls, so frequently mentioned in our report, might, without explanation, be considered objects of extravagance; we will, therefore, add, that the valley of the river, occupied by this canal, is bounded, to a great extent, by high, rocky cliffs, which, in many places, project into the water, leaving to the engineer no other course than to blast his path through them, and to establish the foundation of his embankment in the river itself.

The next object of our examination was the aqueduct over the Great Monocacy. This structure is 438 feet long from the face of one abutment to the face of the other, and the masonry of the abutments and wing-walls extends ninety-six feet further. The whole work will consist of two abutments, six piers, and seven arches. The masonry of the abutments and piers rests upon the solid rock which forms the bed of the river, and which had been previously cleaned and prepared for the purpose.

The arches are to be fifty-four feet in the span, with a rise of nine feet. The two arches, which rest against the abutments, are conducted, within the abutments, by what is called a blind arch, down to the rock foundation. The centering of one arch is up, the masonry partly laid, and preparations were in activity for erecting other centres.

The piers and abutments are thirty-three feet four inches long, exclusive of the pilasters. The piers are ten feet wide above the water table, and fourteen feet wide. and thirty-eight feet long at the foundations, which last dimensions are preserved up to within one foot of the low water surface.

These piers (except one) and the abutments are now erected, and nearly in a condition to receive the skewbacks.

When the masonry is brought up to the point before stated, an offset is constructed entirely around each pier and the faces of the abutments, after which the range work with hammered faces commences.

The first course of range work is twenty-six inches high, and reduces the abutments to thirty-three feet four inches long. and eleven feet thick. The second is twenty-four inches high, preserves the same length to the abutment, but reduces its thickness to ten feet. There are then three additional courses, one of twenty-two inches, one of twenty inches, and one of eighteen inches high, which brings the piers and abutments to the desired elevation for receiving the spring stone or skewbacks of the arch. The work of these piers and abutments is a system of headers and stretchers, except the interior or backing, which is composed of rubble stone. The stretchers are four feet long. and none are admitted with a less width of bed than two feet. The headers have a front two feet long, and have to extend not less than five feet into the masonry. Their beds are all cut so as to be parallel. This range work is laid in cement or hydraulic mortar, and the interior or backing carefully grouted with the same material.

The ringstones of the arches are cut by a pattern furnished to the contractor, and are to extend into the masonry three feet, and five feet alternately. The depths of these stones are so arranged as to be three feet at the spring of the arch, and to decline gradually to two feet six inches at the crown.

The sheeting stone are also cut to the same angles as the ringstones, and to range well with them.

The whole of the arch masonry is also to be laid in hydraulic mortar, and the entire extrados of the arch is then to be carefully grouted.

The canal passage is to be eighteen feet six inches wide at the bottom, and nineteen feet six inches at the water surface, with a depth of six feet.

The work, when completed, is to be surmounted by an iron balustrade.

Mr. Cruger, the resident engineer, showed to us also the specifications of this work, (which form a part of the contract with the builder,) describing the manner in which it was to be executed, and the dimensions of its various parts. We observed, at the foot of these specifications, the name of the celebrated civil engineer, Judge Wright, who was formerly in the employ of the company.

A temporary railroad has been constructed to the quarry, from which the stone for this work is obtained, and which is situated about three miles back from the river. We visited the quarries. The stone lies high, and is of easy access; its color a dull white. It is of the kind usually called by workmen mountain granite, but by geologists it would be called a gray wacke. It splits well, hammers without fracture, is fine grained, and, in our opinion, a very lasting stone.

The work was executing in good faith by the contractor, and was vigilantly watched and inspected by the engineer. We consider the plan judicious, as well as its execution, in which are united the true principles of economy, usefulness, and durability.

After having completed this examination, we crossed the Monocacy, and continued up the excavated part of the canal. A short distance beyond the Monocacy, there is an arched culvert for the delivery of the Little Tuscarora. It extends one hundred and thirty feet under the canal and its embankments, with a span of twelve feet. It has every appearance of faithful work. One and a half miles farther there is another culvert of sixteen feet in the span of the arch. In addition to the delivery of a small stream, this culvert is also intended to serve for a roadway. It is about half done, and is a well executed piece of work. From this we continued to the "Point of Rocks," where the excavation for the canal at present terminates, and near to which there is another arched culvert, completed and well executed. In all this distance from the Monocacy, of five and a half miles, in which there is no lock, the canal trunk is excavated, the towpath formed, and the works of masonry in a state of forwardness; and with the exception of the Monocacy aqueduct, we see no reason to doubt that the entire line from the "Point of Rocks" to the Georgetown basin, a distance of about forty-eight miles, might be in readiness, without extraordinary exertions, to receive its water by November next. Our doubts in relation to the completion of this aqueduct by the time just stated, arise more from the severity and length of the sickly season in that locality, than from any opinion that this work is not also within the limit of ordinary exertion.

All the lock-keepers' houses are good stone structures, with one exception, and this is a good frame house.

The towpath throughout the entire line is upon the embankment next to the river, and is nowhere less than twelve feet wide.

We have already spoken, in the course of this narrative, of the method

pursued in building the aqueducts; we will now add, generally, that which is followed in relation to the culverts and the locks.

In all cases where a rock foundation can be conveniently obtained, it has been resorted to; the rock carefully cleaned, its loose and defective parts removed, and the required extent of surface levelled to receive the masonry. Where the rock was not accessible, and the earth, after excavation, did not appear sufficiently firm, it was carefully rammed and paved with stone, before the timber foundation for the masonry was laid. Where the earth was judged to be sufficiently firm, the timber was at once laid upon it without further preparation. And in proof that the foundations have been carefully secured, we can bear our testimony, that in no instance whatever, except in the tide-lock, and in lock No. 1, at the Georgetown basin, did we perceive any yielding of the masonry, which could be attributed to any defect in the foundations.

The curve of the culvert arches is generally a semicircle: where the span is four feet, the average thickness of the arch is fourteen inches; where the span is six feet, the average thickness of the arch is eighteen inches; where the span is eight feet, the average thickness of the arch is twenty inches; and where the span is twelve feet, the average thickness of the arch is twenty-four inches. The sheeting stone of these arches is rubble stone; but all are to have good fair beds, with their joints dressed with the hammer, each stone having a good binding length. The sheeting is laid in hydraulic mortar, and then grouted with the same material; and the whole, including the abutments, is protected with a puddle-work two and a half feet thick.

The ringstones of the culverts are carefully cut, and have hammered faces. Those for a four foot span, are twelve inches deep; for a six foot span, fourteen inches deep; for an eight foot span, sixteen inches deep; and for a twelve foot span, eighteen inches deep. These stone are required to extend into the arch, alternately, from fifteen to thirty inches in culverts of a four foot span, and from twenty to forty inches for those of a greater span. For the wing and parapet walls the stone have hammered faces, are well bedded and jointed, and the work is surmounted by a coping ten inches thick and two feet wide.

These culverts are all of an admirable length, extending well and sufficiently through the embankments.

When the pit is prepared for a lock, a strong frame of timber is laid, united, and levelled. This frame-work consists of ninety pieces of timber, eighty-two of thirty feet in length, and eight of thirty-eight, squaring ten inches by twelve. The whole is then covered by a course of two and a half inch plank, well secured to the timbers. A second course of planking is also laid from above where the culvert opens into the lock, to three feet below the lowest opening of the culvert. Three courses of plank piling are driven five feet below the timber frame, one at the head, one at the foot, and one at about the centre of the frame-work, before the planking is applied. This frame-work extends over a width of thirty feet, and a length of one hundred and forty-one, and is the prepared foundation for the masonry. The main walls of the lock are seven feet thick, with a buttress of one foot from the head to three feet below the lowest opening from the culvert, and are continued at this thickness for a height of three feet. The wall then falls in one foot, but not the buttress, and maintains this thickness of six feet to its top.

All the facing stone in every part of the lock exposed to view is cut, and coursed with parallel beds. No range is admitted less than one foot thick, nor with less bed than its face, and each stretcher is to be four feet long. A header is required to every ten feet, to extend not less than four feet into the wall, and to be two feet long at its exposed face. The coping stone are not less than twelve inches thick and three feet wide.

After the masonry is finished, an additional course of two inch plank is laid throughout the whole of the chamber, and below the lower gates, and an embankment of earth is raised against the back of the walls, and up to their height.

The range-work of these walls is laid in cement or hydraulic mortar; the backing, or dead wall, which is of rubble stone, is carefully grouted with the same material at every range.

These are the general principles and methods which have governed in the masonry of this canal, varied in some instances according to the discretion of the engineer. We are assured that they have been the guide in such works as have been completed, and we had proof in our examination that they were observed in such as were being made.

There is no lock built upon an inverted arch.

We are fully aware that, after all we have said, we have not yet given an adequate idea of the great and interesting work we have been directed to examine. The difficulties which have been surmounted; the quantity of labor it has received; the vast amount of rock excavation; the extent and excellence of the walls of dry masonry; the durable aspect of all the structures; the great and imposing dimensions of the canal; the judicious adaptation of the excavations to the fillings and embankments; can be duly appreciated only by visiting the work.

The trade of the canal in the part now in use is very active; there is, however, a necessity for a system of regulations to govern the boatmen. The use on the canal of the iron pointed boating poles should be entirely and immediately prohibited.

In our examination we were accompanied by Mr. Purcell and Mr. Cruger, resident engineers, and Mr. Vanslyke, superintendent of repairs.

Mr. Purcell accompanied us throughout the extent under his charge, from the basin at Georgetown to three miles beyond the Seneca; and Mr. Cruger, who joined us at the Great falls, remained with us until we completed our examination at the Point of Rocks. We are under many obligations to these gentlemen for their polite and intelligent attentions. They drew our notice to every part of the work; were anxious that it should undergo the most minute inspection; and pointed out to our attention those parts at which some defects had been discovered, with the confidence of men who were conscious that all usual care had been bestowed in the first instance, and that any liberal and intelligent mind would attribute these defects to their proper causes.

In stating the extent which these gentlemen superintend, we desire to be understood as merely referring to circumstances at the period of our visit. We do not know how long each has had the parts stated under his charge, nor what changes in this respect have ever been made. Our object is not to attach responsibility or praise or blame to any one, but merely, in giving a simple narrative of what we saw, and its condition, as free from personal application as possible, to name the officers of the company who

were with us, and to whom we are indebted for so many of our facts of distances and dimensions.

The resolution of the Board of Canal Directors, which accompanied your order, requested also an investigation of the cost of the canal. We find that, were we to enter upon this subject, it would much delay and much extend our report, which may already be considered as having arrived at a repulsive length. We have therefore to request that this part of the examination may not be insisted upon, and the more especially as the Board itself furnishes frequent and authentic statements of the expenditures.

There remains now but one subject for our remarks, and that is, the general plan of the canal, by which we mean its location, and its dimensions, breadth, and depth. The location involves considerations of cost, of security from freshets, and of unembarrassed construction of the culverts and aqueducts. We have not yet collected the data which would justify us in any other opinion on this point, than that, from appearances, all these considerations have been duly weighed by the engineer. In relation to the width and depth, we will merely say that, as engineers, we would have been perfectly satified had we found these to have conformed to the advice of the United States Board of Internal Improvements, as expressed in its able report of October, 1826, and we think it may yet be found expedient to adopt these dimensions above Harper's Ferry.

Respectfully submitted.

JOHN J. ABERT,
Lieutenant Colonel and Topographical Engineer.
JAMES KEARNEY,
Lieutenant Colonel and Topographical Engineer.

WASHINGTON, *June* 13, 1831.

C.

FIFTH ANNUAL REPORT

Of the President and Directors of the Chesapeake and Ohio Canal Company to the stockholders, made Monday, June 3, 1833.

The President and Directors tender to the stockholders of the Chesapeake and Ohio Canal Company their cordial congratulations on the favorable aspect which their great enterprise has assumed since the fourth annual report. Subsequently to the general meeting in June, 1832, the various works which had been then begun, as well as those which were let at that time, and in the ensuing month of August, have been vigorously prosecuted; those above the head of Harper's Ferry falls, at a cost reduced much below the estimates which immediately preceded the contracts for their construction.

But for the prevalence of the cholera along the northern shore of the Potomac, during the last autumn, the navigation of the canal, from the head of Harper's Ferry falls to its eastern termination in the mouth of Tiber creek, a distance of sixty-four miles, would have opened early in the last month, as had been confidently expected.

All the works, under contract, were more or less retarded by this epidemic, which spread alarm in every direction. Its mortality in the valley of the Potomac bore, indeed, no proportion to the terror which its approach inspired; and some of the most difficult sections, as well as portions of the masonry, were conducted by the aid of precautionary remedies, the establishment of hospitals, and due attention to the sick; and by repeated efforts, which, in part, succeeded, to obtain masons and stonecutters from the North.

Notwithstanding this formidable obstruction, combined, as it was, with confident predictions, and with frequent rumors of the failure of the resources of the company, the most costly part of the new line of canal above the Point of Rocks, in length 14 miles, surpassed, in intrinsic difficulty, by none which has been executed, except at the Great falls, along with the 26 miles which have so long awaited a supply of water, will be brought into profitable use by the expiration of the present month. By the 5th, its masonry, the superintending engineer states, will all be completed, including a stone aqueduct of three arches, nine locks, many culverts, and much dry masonry, both external and internal, comprehending, in the last, a massy wall and embankment of rock, 30 feet wide, and elevated 20 feet above the bottom of the canal, at the cost of $20,000, to serve as a public highway along the base of the mountain at Harper's Ferry, where the old road is occupied by the canal.

By the 1st of July, a boat will be able to enter the canal from the mouth of the Shenandoah, in the midst of the Harper's Ferry falls, and from the bed of the Potomac, at the head of those falls, which have hitherto constituted the most formidable obstruction above the mouth of the Seneca to the navigation of the river.

The works above those falls, embracing 37½ miles of canal, and extending their effect over a distance of 53 miles, along the valley of the Potomac, including two costly dams across that river, have proceeded, under similar discouragements, with like diligence.

The force employed on this part alone of the new line has averaged, for the five weeks preceding the 18th of May, according to the weekly returns of the engineers engaged in its construction, 2,700 laborers, 655 horses, mules, and oxen, and the powder employed in blasting rock 7,000 pounds a week. The entire force on the canal, for the same period, has been 4,460 laborers, 1,048 horses, mules, and oxen, assisted by an average weekly consumption of 10,000 pounds of gunpowder.

The accompanying tables, which have been repeated at every quarter of the past year, and subjected to successive corrections, show the actual and estimated cost or value, as well as quantity, of every description of work which had been done, or remained to be done, on the first day of the last month, in order to complete the entire line of 102 miles of canal, and 15 miles of still water navigation, next above the basin now forming at the mouth of Tiber creek, in Washington.

At that period, the total value of the work done subsequently to the 1st of May, 1832, above the Point of Rocks, exclusive of the cost of superintendence, land purchases, and condemnations, office and other incidental expenses, will be perceived to have amounted to $753,019 26¼ cents. From other documents, it will be seen that the work done in the same period, below that point, was estimated at $162,192 63 cents. In this sum is included $53,107 35 cents, expended within the city of Washington, and $21,220 72 cents on the dams at the head of the Little falls, and at the entrance of the canal at present in use. The greater part of this last sum properly belongs to the head of repairs.

The total expenditure on the construction of all those works has been $915,211 89¼ cents.

The work remaining to be done at the same date, in order to complete the canal under contract, will be seen, from the same tables, to amount in value :

For that in Washington, to - - - -	$11,740 28½
For that between the Point of Rocks and the head of Harper's Ferry falls, to - - - - -	94,545 00
For that above these falls, and below the ferry at Shepherdstown, inclusive of the lock just let, to - -	32,537 00
And for that above Shepherdstown, to - - -	513,958 22¾
Making the total amount,	$702,815 51¼

In the estimate of the work below Shepherdstown, is included a valuation of certain incidental works, part of which may be judiciously deferred ; while, from that above Shepherdstown, the estimate for incidental works is excluded, being made up so as to comprehend what properly belongs to a distinct head of expenditure, an allowance for lands purchased or condemned for the use of the canal. The value of the work which remained to be done on the 1st of May, between the Point of Rocks and the head of Harper's Ferry falls, in order to provide for the admission of water through the feeder at the latter, the resident engineer certifies to have amounted to $70,568 ; of which, a value of $40,000, he states in his report of the 28th May, to have been done on the 24th of that month ; leaving only a value of $30,568 to be done preparatory to the introduction of the water of the river through the guard-lock at the head of those falls.

In this sum of $30,568, is included all the incidental works remaining to be constructed, and, among them, the houses of lock keepers and bridges.*

But the water of a small feeder from the Tuscarora, emptying into the canal seventeen miles below the head of Harper's Ferry falls, on a level, running a mile above the Point of Rocks, has been already admitted through the Monocacy aqueduct; and, aided by the late heavy rains, and the long period during which the far greater part of the canal below the Monocacy basin has been completed, will shortly prepare this part of the line for the admission of a sufficient depth of water for navigation.

To the various works which are included in the May estimates, there has been recently added, by contract, in compliance with one of the conditions of the late subscription of Virginia, a lock opposite to Shepherdstown, for the connexion of the river and canal navigation; the cost of this lock makes an addition of $12,500 to the sum already stated as the value of the work to be done; and a determination has been more recently formed by the board, to transfer the locks which were about to be commenced two miles above, to a point two miles below, the mouth of the Opeccon, so as to subserve the same purpose with that last mentioned. By this transfer, and the construction of a towpath along the three miles of steep rocky cliffs immediately above and below Galloway's mill, an extension of four miles will be given to the canal, and about $100,000 added to the cost of the first 117 miles of improved navigation, which will then consist of 106 miles of canal, and 11 miles of slack water in the bed of the river.

From the addition of these sums to that before mentioned, an aggregate results, as the measure of the work to be done subsequent to the 1st of May, of $815,315 51¼ cents.

This appears to be a large sum to expend between that day and the 1st of October, the period now allowed for the completion of the part of this work already let, amounting to $715,315 51¼ cents; but nearly the entire line of canal below Shepherdstown will be finished by the 1st of August; and if the force employed on it, and upon the works below the head of Harper's Ferry falls, which will be completed during the present month, be concentrated upon the works above Shepherdstown, they could be finished in the above period. As the dams should not be exposed to the hazard of the winter's ice in an unfinished state, and, when completed, must necessarily obstruct the navigation of the river, till its place is supplied by the canal, the progress of the unfinished works should be expedited by all practicable means, consistent with their ultimate security and a sound economy. Of the completion of the two dams, and of all the masonry, especially of the most costly, that of the aqueducts and locks, by the month of October next, no doubt whatever is now entertained; and much may be accomplished, by engaging, on the unfinished sections, the laborers discharged from the other works, as these are successively finished.

There had been disbursed on the 1st of the last month, out of the company's funds, since the 1st of May, 1832, the sum of $821,392 74, as will be seen by a comparison of the Treasurer's statement of the 30th of April, 1832, published at the end of the fourth annual report, with that of the 30th of April last, hereto appended. Of this amount, the sum of $754,573 87 has been applied to the *construction* of the canal; $19,453 30 to the engineer department; $6,935 50 to the pay of officers; and $27,655 79 to the ac-

*The total value of the work done in May, above the Point of Rocks, is $103,421 46.

quisition of lands; the other items are inconsiderable. A review of the objects of this expenditure is designed to manifest the importance of such a progress of the various works as shall increase the relative cost of the *construction of the canal*—that work, of which the benefit is to be perpetual, and of proportionably reducing all other items of disbursement. To effect this purpose, the works of the canal should be at all times as vigorously pushed as prudence will admit.

There would appear to be a discrepancy between the sum above stated to be the *price paid* in the last year for the construction of the canal, and the much larger amount of the value of the *work done;* but the heavy estimates of last April are not included in the payments made prior to the 1st of May; and all the retained money out of the estimate for the *new work* is to be added hereafter to the disbursements on that account. This sum, for the work done, amounted, on the 1st of May last, to nearly $100,000; part of which has been subsequently paid, but the far greater part is still withheld, according to the terms of the several contracts, till the work be completed for which it is due; this being, in fact, the only security for the faithful and diligent compliance, on the part of the contractors, with the terms of their respective contracts.

It has been seen that the value of the work to be done, under the contracts actually made, or essential to the completion, in the best manner, of the entire line of canal, below the dam next above Williamsport, amounts to - -		$815,315 51¼
Add to this amount, for the retained money in the hands of the company on the 1st of May, and not included in the sum since paid, - - - - - - - -		84,684 48¾
And the total sum *to be paid* for the work done, and to be done, exclusive of the April estimates, and the sum paid in May, or to be paid, for condemned or purchased lands, and certain contingencies, will be, - - - - - -		900,000 00
Putting down the April estimates, and the retained money paid in May, at the actual amount paid,	$138,342 56	
And the sum paid for lands, in like manner, at	26,623 44	
	164,966 00	
And allowing for salaries of the engineer department, and the pay of officers, for one year, - - - - - -	25,034 00	
	190,000 00	
And for the acquisition of lands and contingencies, the further sum of - - -	16,000 00	
In all, making - - -	206,000 00	206,000 00
And there results, as the sum required to complete the first 117 miles of improved navigation, comprehending 106 miles of canal,		$1,106,000 00
From the Treasurer's report, and other documents, it will be seen that the resources to meet this expenditure consisted, on the 1st of May, of cash, to the amount of -		$508,532 62

Of uncalled for and uncollected stock, to the amount of -	616,571 92
To which, adding the sum to be received from the Baltimore and Ohio Railroad Company, after deducting therefrom the amount presumed to be necessary to graduate the residue of the 4 1-10 miles of that road, not already charged, - - - - - - - - -	170,000 00
And there arises an aggregate fund of - - -	$1,295,104 54

to provide for the preceding expenditure. So that there will remain, after completing all the works under contract, after complying with two of the conditions on which the subscription of the State of Virginia was granted, the accommodation of the river boats near Opeccon, and at Shepherdstown, and after adding four miles of canal, and a towing path of three miles, to the objects of expenditure, contemplated at the date of the fourth annual report, the sum of $189,104 54 cents, to be applied to the future extension of the canal.*

It would have been more consonant with the plan of completing the eastern section of the canal hitherto recommended, to have reserved, for its immediate extension above the dam, near Opeccon, to the mouth of Cacapon, the one hundred thousand dollars here applied to the four miles of canal, and three miles of towing path, above, or along Galloway's cliffs. But a consequence must have then resulted, which the Board would not at any time have permitted, but for the possible incompetency of the funds of the company; that of separating the horses from the boats which they track, for a distance of seven miles, between two distinct canals along the Potomac. To avoid this, a towpath must have been made for this entire distance, at a cost, for a part of the way, at least, exceeding that of a canal; and at the hazard of exposing to imminent danger any canal which might be hereafter made along this space, by cutting off the growing timber from the river banks, along an alluvial bottom of more than two miles in extent. The transfer of the locks from a point above, to one about the same distance below the mouth of Opeccon, will also favor the contemplated navigation from that stream, whenever the canal along the base of the cliffs shall be completed, by exposing the boats which descend from its mouth to a shorter voyage on the broad bed of the river, in conformity, as has been suggested, with one of the conditions of the late Virginia subscription, which the Board duly regarded. Assuming, in round numbers, the sum of $189,000 to be the surplus of the present resources of the company, applicable to the further extension of the canal to the mouth of Cacapon, and considering it adequate to an immediate preparation for commencing that subdivision, the Board have directed a location, survey, and estimate to be made of this part of the eastern section of the canal, preparatory to its construction.

Although the above sum is obviously inadequate to the completion of this subdivision, occupying, as it does, *a distance of twenty-five miles, yet it is competent* to supply the means of preventing the delay of a year, by preparing the foundations of the dam at Cacapon, and of the abutments and piers of such aqueducts as can be begun and prosecuted with most economy, at the lowest stage of the water of the Potomac, which usually occurs late in the last month of the summer, and the first of the autumn.

* The addition to the canal of four miles, and the towing path of three, are found to cover this balance.

At this stage of the report, it is proper to review the cost of the canal already constructed, or in progress, in order to form, with some degree of accuracy, an estimate of the future cost of that which remains to be begun; and to consider, and, if practicable, to provide the means of its completion, at least through the whole extent of its eastern, and, if possible, of its western section; to commence which, authority has recently been granted by two of the parties to the charter of the company, Virginia and Maryland, at the earnest suggestion of Pennsylvania.

The President and Directors have, on all occasions, invited the most rigid scrutiny of the various works of the canal, on the part of the Government of the United States; but since the inspection and report of two scientific officers of high rank in the army, Colonel Abert and Colonel Kearney, of the 13th of June, 1831, they have not, until very recently, been able to obtain the appointment of an engineer of the United States, for that purpose.

On the 8th of May, the Board repeated, after the interval of a year, an application for such an examination, through the Secretary of the Treasury, who, by a special act of Congress, is made the proxy of the United States.

To that letter, the annexed answer was returned on the 1st of June, announcing to the Board the gratifying intelligence, that the duty of making such an inspection had been assigned to Captain William Gibbs McNeill; in reply to whose letter, of the same date, the orders, which will be seen in the annexed correspondence, were immediately issued to the engineers who have charge of the company's works.

No assumption can be more erroneous, than that any part of the funds of the company have been improvidently applied, by those who have directed its affairs. It is not known, nor believed, that a single individual has been enriched by the construction of any part of its works, or has received more than a moderate and reasonable compensation. The works above the head of Harper's Ferry falls, 37½ miles in extent, were let for $100,000 less than the prior estimate of the same engineers, to whose tables this report refers, for the measure of their actual and probable cost, founded on existing contracts. The fourteen miles, already in part executed, descending as far as the Point of Rocks, will be perceived to have cost something, though not much, more than their prior estimate: a result ascribable to the expenditure of $24,500, for supplying a public highway, in lieu of that supplanted by the canal, and to the necessity of transporting part of the stone, for its masonry, from a great distance, at a very heavy charge for its carriage. The sections of this work will have actually cost less than the estimates on which the contracts for their construction were founded; and the work of the more difficult passes, considerably less than the prior estimates of the civil engineers, Messrs. Roberts and Knight, acting as commissioners of the Chancellor of Maryland. To swell the cost of the entire canal, or sustain a charge of waste and extravagance against those who have conducted its operations, by referring to the expense attendant on that part of it, below the head of tide water, would be as inconsistent with truth, as unjust in itself, since the President and Directors were driven to that measure against their judgment, by the voice of the stockholders, in a general meeting convened for that express purpose. The breadth of this extension was prescribed by an act of Congress, as far down as the market-house in Georgetown, for the benefit of

Maryland; and the Rock creek basin and locks, which connect a long line of canal with the harbor in which it terminates, are, moreover, chargeable, not upon a part, but on the whole line of navigation. The objection of the President and Directors to this measure, urged as it was, till it threatened the dissolution of the company, applied rather to the time, than to the ultimate utility or mode of the proposed extension.

Deducting for the works below the head of tide water, the origin of which is here correctly given, six miles, and their appropriate cost, there will be found to remain one hundred miles of canal, three of towpath, beneath a stupendous cliff of rocks, and eleven miles of slack water navigation, which have been completed at the expense of less than $32,000 a mile for the canal. That a great part of this cost is ascribable to the appalling difficulties, the heavy walls, and lockage encountered in passing from the tide through the granite ridge, which terminates in the sixteen miles above the head of tide water, comprehending a fall of one hundred and eighty feet, will be seen in the following results, derived from a reference to the reports of the company. That the forty-two miles above the Harper's Ferry falls, added to the three miles of towpath under Galloway's cliffs, will have cost, when completed, at their present contract price, inclusive of the extra locks at Shepherdstown and Opeccon, designed to comply with the conditions of the Virginia subscription, less than a million of dollars, including the expense of land purchases and condemnations, though excluding all contingent expenses, being, if every expense be comprehended, with the cost of construction, less than $25,000 a mile for the forty-two miles.

The entire line of the present third residency, extending from the 40th to the 133d section, embracing the locks opposite to Shepherdstown, and a space of forty-six miles in length, although comprehending, among other aqueducts, a single one, (that of the Monocacy,) which has cost $125,000, will have been completed, by the 1st of August, for $1,150,000, being $25,000 a mile for its construction, apart from all other expenses, which cannot be computed at an advance upon that sum exceeding ten per cent. For thirty-six miles, this part of the canal maintains a water surface more frequently enlarged beyond, than reduced below, sixty feet, its required breadth; and for the remaining ten miles, a breadth of never less than fifty feet, and often extended, for considerable distances, beyond sixty. The entire line of forty-six miles has a depth, throughout, of six feet, designed for the easy trackage of one hundred ton boats, by two horses. Its culverts, sixty in number, are, throughout, adapted to its full breadth, and have cost $110,000; its sixteen locks of cut stone, one hundred by fifteen feet in their chamber, will have cost $170,000; its three aqueducts of stone arches $180,000.

That no peculiar facilities aided its construction on this extended, and, therefore, more useful plan, is evident, from the following facts: that its simple excavation comprehends two million four hundred and forty thousand cubic yards of earth and rock; its embankment two million twenty thousand five hundred; its external walls, one hundred and twenty-six thousand perches of dry masonry. Its towpath, protected often by these walls, is never less at the surface than twelve feet wide, nor its berm bank than eight. It exceeds, in its dimensions and the strength of its embankments, the plan of a canal recommended to Congress by the Board of In-

ternal Improvement of the United States, as much as its actual cost has fallen short of their estimated cost.

On the preceding data, the Board ground their estimate of the future cost of the residue of the eastern section of the Chesapeake and Ohio canal.

On this line, seventy-five miles in extent, supposing it subdivided into three parts by a dam and feeder, immediately below the mouth of Cacapon, another below the mouth of the South Branch, and a third, the last, one mile above Cumberland; the cheapest portion to improve, will be found to be that which first presents itself in ascending the Potomac. The most necessary, perhaps, for the immediate use of the river and canal, is the last; since, above the South Branch, the bed of the Potomac does not contain water sufficient for navigation but for a short period of the year.

This entire work cannot safely be computed at less than $1,850,000, or $25,000 the mile; and of this sum, the pecuniary resources of the company, making due allowance for unavailable stock, do not at present supply more than $150,000; leaving, consequently, $1,700,000 to be hereafter provided.

From this estimate of the pecuniary resources of the company, is excluded any reference whatever to the enlarged power, acquired by the recent acts of Virginia and Maryland, over the surplus water of the Potomac, as well as to that, which the prior charter granted, without limitation, except as to the places where it should be used.

With a view to give activity to this resource, the Board have authorized their engineers so to adapt the several flumes which convey the water necessary to the navigation of the canal, around the locks, as to fit it for the double purpose of sustaining the levels against the effects of evaporation and leakage, and of applying it to manufactures.

For the general application of this important accessary to the uses and resources for completing the canal, enlarged, as it has recently been, it is recommended to await the final issue of the legal controversy, respecting its just extent, now depending in the Supreme Court of the United States, and the issue of such efforts as the friends of the canal, in Maryland, may make to liberate the recent grant of that State from those restrictions, which prevent it from being responsive, in terms, to the preceding act of Virginia.

It would be more expedient to rely for resources to prosecute the works of the canal, on loans, founded on the future exercise of this power, than to dispose of the water which it commands, at a price reduced by the present restraints upon its use.

The act of Congress at the session before the last, authorizing the construction of a wooden bridge of elevated arches, and a spacious draw, in place of the present bridge, across the Potomac at Washington, by securing the navigation of Georgetown from future obstruction, will add to the value of the mole of the Rock creek basin, which has always been computed among the future resources of the company, for the prosecution of their works, and never estimated at less than $100,000.

But a rational doubt should not now be entertained, that Maryland and Virginia will contribute further aid to a work which they founded; and that the Congress of the United States, by whom its progress, hitherto, has been so much accelerated, will continue to this bond of union their countenance and favor.

As confirmatory of this confident hope, the late compromise of the long

subsisting controversy between this and the rival enterprise of a neighboring city, the emporium of the Chesapeake, cannot but be favorably regarded.

The President and Directors have recently received from the Baltimore and Ohio Railroad Company a resolution of their board, which manifests, in good faith, on their part, the grounds of the sentiment here expressed.

That no accident may interpose to arrest this current of good feeling, the undersigned have caused the works designed for the common use of the Frederick turnpike, and the railroad, to be vigorously prosecuted; and have already let to enterprising contractors, of high reputation for fidelity to their engagements, the residue of the road, to be graduated by this company, with a stipulation to complete it by the end of the ensuing winter; two months and one-third sooner than is required by the late compromise effected between the two companies.

At the same time, the undersigned have sought, in those contracts, to preserve the navigation of the canal from serious interruptions, by regulations carefully guarded, and approved by the contractors themselves. They are charged, by one of them, with a responsibility to the party aggrieved, for any interruption which may occur to any boat between sunrise and sunset of each day, while the navigation of the canal is open, as it will be from the commencement of the ensuing month, except for a few weeks in the approaching harvest, and when the navigation of the river is suspended by drought or frost.

In looking forward, after an attentive review of the past, the Board entertain the confident belief that the Governments of the Union and of the several States, who are concurrent parties to the great enterprise which has so signally triumphed over all the moral as well as physical obstructions which have impeded its growth, will not allow it to languish, for want of the comparatively small sum required for its eastern section.

It is proposed, therefore, to invite from the Congress of the United States, and the States of Maryland and Virginia, an enlargement of their respective subscriptions, to an extent adequate to this object.

Maryland will, it is humbly conceived, readily discern that this company have complied with her wishes, in a manner which has reduced, for the benefit of another work in which she takes a deep interest, by an entire moiety, the fund which she designed to be the price of the compromise which her influence has effected, and the means of extending the canal to Cacapon.

While a heavy expense has been incurred, for the benefit of the Shenandoah trade, and the liberal subscription of Virginia has provided for other connexions, between the southern shore of the Potomac and the canal on its opposite bank, there yet remain important objects to be attained in the future commerce of the northern frontier of that great State, through the Potomac, which will conciliate, it is confidently believed, her favorable regard.

The capital of the Chesapeake and Ohio Canal Company now exceeds four millions of dollars, one-fourth only of which has been supplied by the United States; and the relation of this great work to the District, of which Congress is the exclusive Legislature, combined with the national character imparted to it, by its enlarged dimensions and solids tructure, as well as by its obvious purpose and tendency, to unite the Eastern and Western waters, by the shortest practicable connexion, through the centre

of the Union, constitute too many claims on the liberality, wisdom, and patriotism of Congress, to doubt their future exertions in its behalf.

In aid of the western section, which Maryland has now united with Virginia in giving to this company power to commence, with funds to be specially subscribed for that object, Pennsylvania has requested her Senators and Representatives in Congress to ask from the General Government the subscription of a million of dollars.

For the portion of this section comprehending the Alleghany, whether that mountain is to be crossed by a canal or railway, no better provision has occurred to the undersigned, than that, which once received the sanction of a very high authority, in a letter addressed to the President of the United States, and subscribed with the names of seventy-six members of the House of Representatives, asking the direction of a part of the military force of the country to this national object.

Keeping the completion of the entire work always steadily in view, the solicitude of the undersigned to reach the coal mines of the Alleghany has never been for a moment abated, or diverted from its object.

In considering all the resources for completing this work, that should not be omitted which the revenue of its expended capital may be expected to afford, either directly, by its immediate application to the construction of the canal, or by augmenting the market price, and favoring future subscriptions to its stock.

The tolls, for the last fiscal year, have amounted to $22,625 55, having fallen short of the sum received during the year next preceding, in consequence of the unavoidable obstruction of the navigation of the Potomac by the works above Harper's Ferry, and of the very deficient wheat crop of the last harvest.

This declension of revenue has been ascribed to the withdrawal of a part of the usual supplies of the District markets from their accustomed channel, by the intervention of the Baltimore railroad at the Point of Rocks; but the reports of the canal collector show this suggestion to be groundless.

The revenue of the canal, like the commerce of the District of Columbia, will be ever subject to such fluctuation, till its tonnage rests on a foundation less mutable than the wheat crops of the upper country, a single agricultural product, subject to annual variations of quality as well as quantity, with the change of the seasons.

When lumber, the chief source of the revenue of the great canal of New York, and of other canals in America, and coals, coke, and lime, the principal sources of the revenue of the most profitable canals of Great Britain, shall have been added to the staples of the present commerce of the Potomac, the revenue of the Chesapeake and Ohio canal will probably yield, in productiveness, to that of no other internal improvement in the United States. But to add these now almost dormant commodities to the tonnage of this canal, it must be extended to the country which supplies them.

The lands near the margin of the Potomac, below the mouth of the Cacapon, have long been stripped of the far greater portion of their valuable timber. Lime, indeed, both hydraulic and common, is to be found; the latter almost every where between Harper's Ferry and the north mountain; but the mineral coal, which should cheapen its preparation for use, and bring it into successful competition in the District markets, with the same commodities from other sources, must be sought still higher up the Poto-

mac, either in the vicinity of Cumberland, or at the base of the Alleghany mountain.

Three hundred thousand bushels of coal are said to have been brought to Cumberland in the last winter, to await the spring freshet, for distant transportation. The price of coals there varies from six to eight cents a bushel. But the main reliance for bringing into extensive use the coal of the Alleghany, must be, not only on the completion of the eastern section of the canal, but on the further extension of the improved navigation of the Potomac, either by a continued canal, or by a system of locks and dams above Cumberland, as high up the North Branch as Westernport at the mouth of George's creek, and near the mouth of Savage.

From the banks of the former of those streams, one mile above its mouth, coal is now shipped, in seasons of very high water, at the expense, to the proprietor, of a cent a bushel, which pays the cost both of digging and lading; while its price, when delivered at Williamsport, is as much as eighteen, and at Harper's Ferry twenty cents a bushel.

The distance from Williamsport to the coal banks on George's creek, by water, is about one hundred and five miles; and, if the highest toll be charged that could lawfully be demanded, and the highest price allowed for transportation, at which it has been computed, or for the former two cents, and the latter one cent a ton, per mile, twelve and a quarter cents would pay all charges but the rent of the mine, for delivering this commodity at the upper of those markets; and allowing the present difference of price, for its delivery at the lower, by the present defective navigation, between Williamsport and Harper's Ferry, fourteen and a quarter cents, instead of twenty, would be its price, at the latter.

But, as the expense of toll and transportation would each be reduced to one-half the above estimate, coals may be delivered at Williamsport, when the improved navigation of the Potomac shall have been extended to the Alleghany, at six and five-eighths cents the bushel, or allowing three-eighths of a cent for the subsistence of the miner, now paid by the proprietor, at seven cents, exclusive of the rent of the mine; the amount of which will depend on the extent of the coal region, and the competition of its numerous proprietors.

At this estimate, coals could be delivered in the District of Columbia at about twelve and a half cents, on the supposition that each bushel of eighty pounds weight paid a toll of four cents, and the ton of twenty-eight bushels, one hundred and twelve cents, for the use of two hundred and five miles of improved navigation.

The extent of the coal region may be inferred from the fact, that the present price of the most convenient coal lands varies from one hundred to one hundred and fifty dollars the acre: so that the rent of the mine would probably not enhance the cost of the commodity more than one-fourth, or, at most, one-half a cent a bushel; by which its cost would be raised to thirteen cents a bushel, at the District wharves, or to three dollars and sixty-four cents per ton, a moiety only of the present current price in this District, in seasons of unobstructed navigation.

It is evident, therefore, that coal will bear a heavier toll than has been last suggested, at least for some time after the improvement of the Potomac navigation shall have reached the Alleghany; and perhaps it should bear a heavier, until other staples shall yield to the Canal Company a revenue to supply the place of a part of that income, which this prime ne-

cessary of life, and powerful agent in multiplying all its comforts, is so certain to afford.

At a cent a ton per mile, a moiety of the legal maximum toll, allowing half a cent a ton per mile for transportation, 28 cents for the wages, 9 for the subsistence of the laborer who digs and delivers it at the water's edge, and 14 cents the ton for mine rent, its cost, at the District wharves, would be but $3 53½ the ton, or less than 13 cents the bushel of 80 lbs.

Supposing the quantity which annually descended the river to tide water, to amount to one thousand boat loads, or a hundred thousand tons, making no estimate for that which would stop on the way down, in a voyage of 205 miles, along the margin of two States, the borders of which have been stripped of their timber for half that distance, to give place to cultivation, and which will hereafter be lined with towns and villages, the annual toll, at this rate, would exceed $200,000, or three per cent. on the entire capital expended in giving activity to this important branch of traffic.

Lumber, or the produce of the forest alone, has yielded, on the New York canal, nearly thrice the amount of this revenue; and when the Potomac canal shall have ascended to the uncultivated lands of Virginia, Maryland, and Pennsylvania, on the head waters of the Potomac, a revenue from this source, equal to that from coals, may be expected on this canal. And if to those two commodities be added the tolls on lime, both hydraulic and common, applied as well to agriculture as the arts in general, and on various species of marble and stone, on hemp and iron, it requires no stretch of imagination to perceive, without any reference to the tolls, on the *return loads* of merchandise, plaster, and fish, that the stockholders of the Chesapeake and Ohio canal will be amply remunerated for the sacrifices they have made, and the losses they have unavoidably sustained, during the unexpected delay of the progress of their great enterprise.

The most prominent, if not the sole cause of this delay, was contemporary in its origin, if it did not precede the commencement of the canal itself.

The company had at least every reason to hope, that, by the decision of the highest tribunal of that State, in the courts of which this obstruction originated, it had been effectually and permanently removed; and their officers proceeded immediately after this auspicious termination of a three years' controversy, to place fifty-two miles of canal along the disputed ground, under contract for construction, with the most confident belief that they would be able to proceed, without further embarrassment, at least to the full extent of their subscribed capital.

They were, however, speedily threatened with the destruction of their whole enterprise, on the ground of that very delay, to which they had been so unexpectedly and injuriously subjected. On very high authority, they were told that they should be denied all further aid from the State to whose laws their property was to look for protection, unless they yielded, by compromise, what had been sought to be won from them by legal controversy.

It were worse than vain to dwell on the various causes which led the undersigned to a formal appeal to the justice of Maryland, through her Representatives, assembled last winter at Annapolis.

The appeal was successful; and, aided by the timely and generous interference of the General Assembly of Virginia, and the liberal donation, by

Congress, of a large sum of money, as the price of the resumption of a prior grant of part of the public mall to the city of Washington, placed the credit of that city, as well as that of the Canal Company, which had suffered with it, on elevated ground, so as to baffle and suspend all further proceedings or threats against the validity of the charter of the company.

Instead of an act to enforce its forfeiture, the authority from whence this harsh injustice had been threatened modified, in most essential particulars, the terms of compromise originally submitted by the Baltimore and Ohio Railroad Company, and superadded other conditions calculated greatly to diminish the injury apprehended by the undersigned from the collateral progress of the two works above the Point of Rocks.

In addition to which, the power was granted to the Railroad Company to subscribe to the stock of the canal two hundred and fifty thousand dollars, under the confident belief of the General Assembly that such a subscription would enter into the terms of any compromise which might result from their act.

By the same act, the Representatives of Maryland gave their assent to one of much magnitude, passed by Virginia, at the instance of Pennsylvania, and essential to the preservation of the charter granted by this State, as well as to another act of Virginia for the benefit of the canal, subject, indeed, to certain restrictions as to one of its grants, which time, it is believed, will hereafter relax or totally remove.

Whatever feeling might have been at any time awakened by the indefatigable hostility of a rival enterprise, the President and Directors of the Canal Company felt it to be their duty to their constituents to avail themselves of the short time which was allowed to meet the liberal intervention of the Legislature of Maryland in the spirit which was known to have prompted it; and, understanding that insuperable objections would be made by the Baltimore and Ohio Railroad Company to any subscription, on their part, to the stock of the canal, they consented to recommend to the stockholders, in general meeting, the waiver of a demand for such subscription, and to meet the Railroad Company on terms of conciliation less objectionable to themselves.

Those terms, along with the act of the General Assembly of Maryland, on which they were founded, are hereto annexed. Having been already communicated to the stockholders at an extra meeting, made by them a topic of much discussion, and approved by their voice, they are here referred to, in order to supply what might be otherwise deemed an omission in that narrative which the annual reports are designed to afford of the progress of the enterprise hitherto confided to the direction of the undersigned.

A comparison is due to the subject, if not to the undersigned themselves, of the terms of compromise submitted, more than two years ago, by the Baltimore and Ohio Railroad Company, with those which have been ultimately adopted. The decision of the undersigned upon the former, as well as their reasons for it, were fully disclosed in a letter addressed to a committee of the House of Delegates of Maryland during the winter ensuing their rejection by the Board.

Of the terms more recently offered by the Railroad Company, it will be recollected that they contained two alternative propositions, and the undersigned having unanimously acceded to one of them, could not be said to have *rejected* the compromise which they proposed.

When the General Assembly of Maryland, by a resolution of their body, pressed on the consideration of the stockholders the other alternative of the above proposal, the undersigned most respectfully submitted the resolution, as was requested, to the stockholders, without a single suggestion, either to favor or to prejudice the adoption of the proposition which it presented.

In comparing the terms supplied by the act of Maryland, and the agreement of the two companies which immediately preceded its acceptance by both, with the terms of compromise, first presented to this Board by the President and Directors of the Railroad Company, they will be found to be distinguished, among other particulars, by the following:

By the original terms proposed, the two works were to proceed together to Cumberland, though a distance, not of 12, but of 146 miles, in actual contact, not for $2\frac{1}{10}$ miles only, but of 47 miles of that distance.

A period of several years and more than two hundred thousand dollars were expected to be consumed in the mere survey, conjoint location, and estimate of the cost of the two works, at their common expense; and to the most serious injury of that which had already expended a large capital, that awaited the extension of the canal for a return of any profit whatever.

A single year only is now required, and less is necessary, to fulfil all the terms of the compromise actually made. Instead of a division of the cost of the conjoint construction, survey, and location of the two works, the whole expense is to be defrayed by the Railroad Company; and instead of allowing no satisfaction for any possible injury to the revenue of the Canal Company or its works, while the construction of the road is proceeding alongside of the canal, an ample indemnity is provided in the sum of $266,000, the computed cost of graduating $4\frac{1}{10}$ miles of the railroad.

By the original proposals of the Railroad Company, and the report of the commissioners of the court of chancery, their road was to be thirty feet wide in the narrowest passes, including half the breadth of a low partition wall between the road and canal; while in all other places, whether essential or not, it might be within eight feet of the canal, so as to preclude any approach to the upper margin of the latter, for the purposes either of commerce or of its necessary repairs. Materials for this purpose might obviously be precluded from reaching the canal at all, enfiladed, as it would be, by the road on the only side whence they could be obtained.

The terms of compromise provided by the Legislature of Maryland, and accepted by both companies, absolutely require, on the other hand, that a breadth of but twenty feet be given to the road at each of the four narrow passes between the Point of Rocks and Harper's Ferry, where it necessarily comes in contact with the canal; and that it shall, at all other places, be removed, as far as practicable, from the canal, consistently with two conditions: that its curvature shall not have a radius any where of less than four hundred feet, except at two points, nor its elevation an inclination any where exceeding thirty feet in the mile; with both of which limitations, it was well known to the undersigned, from having previously studied the ground, that they could readily comply.

One of the chief dangers to which the canal is exposed, from the juxtaposition of the railroad, this act effectually precludes, by requiring that, whenever the Railroad Company shall introduce locomotive engines on their road, they shall guard against the danger of frightening the horses engaged upon the opposite towpath, in tracking the canal boats, by the

erection and preservation, at all times, of a close fence or blind between the canal and road.

Materials are secured, and facilities provided, also, for the repair of the canal, not only by the substitution and conveyance to the Canal Company of other ground for that to be occupied by the road, but the road itself, free of toll, and the cars of the Railroad Company, from the nearest depot, at a reasonable cost for their use, are offered for the transportation of those materials.

Instead of delaying the navigation of the canal for the construction of the road, the act expressly requires that three feet water be kept in it for the public benefit.

The private agreement of the two companies, while it dispenses with the subscription contemplated by the act for a supposed equivalent, and modifies some of the preceding conditions for the benefit of both parties, neither surrenders nor impairs the value of any one provision of the act essential to the security of the canal. In the execution of the terms of compromise, the undersigned have already bargained with the contractors, that in the graduation of the part of the road which the Canal Company have undertaken, no obstructions shall be encountered by any boat but at the cost of the contractor, who is, moreover, required to provide by a powerful engine, to be kept always in readiness for use, the means of removing any stone which may be accidentally thrown into the boat channel while blasting the adjacent rock.

If the apprehension of an injurious rivalship in the transportation of commodities between the canal and road, from Harper's Ferry, rather than from the Point of Rocks, remains after this view of the compromise just effected, it should be remembered that, after conceding to the Railroad Company, with the unanimous assent of the stockholders, a passage across the canal and river at the latter of those points, there remained to the Railroad Company the power to reach the same point, at an enhanced cost, injurious undoubtedly to them, but from whence no benefit could possibly result to canal.

Urged by the deliberate and unequivocal wishes of a State, one of the liberal parties to their charter, and the immediate and sole protector of their various works, to compromise with a rival, whose hostility was about to give place to a sense of common interest, and whose agents gave them a pledge of future co-operation, in stipulating, as a condition of the compromise proposed, to suspend their own progress, along the shore of the Potomac left open to them, until the canal shall have reached the western term of its eastern section, a distance of 186 miles, the undersigned yielded to the spirit of conciliation, what seemed to them due to the parties who invited its exercise, and to the occasion presented by the act of the General Assembly of Maryland.

It was with unfeigned gratification that they found their course approved by the voice of so large a majority of the stockholders, at their last general meeting. The assurances which they have since received from other parts of Maryland, as well as from the citizens of Baltimore, that the most friendly feelings towards their enterprise have succeeded to those which a long protracted controversy had embittered, have further tended to confirm the opinion that the Canal Company, whatever may be the value of what they have conceded, have made no sacrifice of interest that

will not be amply requited, in the future progress of their yet laborious enterprise.

When the canal shall have been completed, as the undersigned now confidently trust it will be, without further embarrassment, while the railroad car is seen pursuing its rapid course to the south, and the canal boats steadily urging their course to the west, the line of but twelve miles for which these great works are brought in contact, by the late compromise, will dwindle into a point, not of collision between embittered rivals, but of union between generous friends, seeking, by different means, a common object—the public good.

In closing this unusually protracted report, it is due to the stockholders to explain why it has recommended no dividend of the tolls hitherto derived from the canal.

Although the efforts before made have been persevered in, to bring to a conclusion the suits instituted by certain creditors of the late Potomac Company, who have not offered to subscribe their claims to the stock of the canal, those suits yet await their turn for adjudication, on the docket of the Supreme Court, by whose decision a just and final construction will be given to the obligations of the new charter.

Since the organization of this company, $88,989 28 have been received for tolls. During that period, twenty-two miles only of the canal have been, at any time, in use, and these, for but three of the five years which are about to expire.

It would appear to be a useless operation, did not other considerations intervene of a more serious character, to pay over to the stockholder to-day, in the shape of dividend, what he must be called upon, in that event, to repay to-morrow, in the shape of an instalment of his stock.

If the tolls shall not be applied to the construction of the canal, other sums must supply their place. Early in the year just commenced, however, the entire amount of the subscribed stock will have been called in; and no reason will operate, if the present legal difficulty of settling the amount of the income to be divided, be removed, to prevent a dividend. With the practicability of making a dividend, it is also earnestly hoped, that, by a considerable extension of the canal, a consequent augmentation of the revenue of the company may render such a measure as expedient as it will be just and proper.

Signed in behalf, and by order of the President and Directors:

C. F. MERCER,

President of the Chesapeake and Ohio Canal Company.

JUNE, 1838.

ABSTRACT of receipts and expenditures on account of the Chesapeake and Ohio Canal Company, to the 30th day of April, 1833.

Dr.	Dolls. cts.	Dolls. cts.	Cr.	Dolls. cts.	Dolls. cts.
To capital stock for amount of instalments paid to date, agreeably to returns received -	–	3,241,829 00	By requisitions paid and charged to contingent expenses of the company - -	11,116 93	
To unclaimed dividends of the Potomac Company. Received from the late treasurer for amount due sundry stockholders - - - - -	–	366 30	By pay of officers - -	31,676 29	
To Potomac Company. Received from the late treasurer -	131 87		By construction of the canal -	2,528,584 82	
To Potomac Company. Received from John Strider, for balance due by him - -	237 30		By Engineer Department -	100,961 90	
To Potomac Company. Received from Jacob Payne, on account - - -	36 18		By western section - -	4,026 08	
To Potomac Company. Received for old iron sold - -	13 17		By stationery - -	1,336 25	
		418 52	By printing - -	5,939 81	
To toll account received to date	–	85,251 14	By postage - - -	348 09	
To acquisition of lands. Received from Tho. C. Wright, for old houses condemned and sold - - - - -	357 60		By toll account - -	838 43	
			By acquisition of lands -	120,441 91	
			By law expenses - -	12,963 68	
			By Potomac Company -	8,219 30	
			By Potomac Company. Unclaimed dividend - -	5 55	
			By interest account - -	2,808 85	
					2,829,267 89
			By balances to the credit of the Chesapeake and Ohio Canal Company, viz.		
			Office Bank U. S., Washington - - - -	10,710 18	
			Bank of Washington -	61,808 13	

ABSTRACT—Continued.

	Dolls. cts.	Dolls. cts.
To acquisition of lands. Received from T. C. Wright, for balance of money advanced, refunded	672 31	
		1,029 91
To profit and loss, received for interest and gain on sales of Maryland stock - -	-	4,703 03
To interest account, received on judgment against delinquent stockholders - - -	-	194 27
To law expenses, received for costs of suit against delinquent stockholders - -	253 05	
To law expenses, for balance of money advanced, refunded -	80 00	
To law expenses, received of Baltimore and Ohio Railroad Company, for costs of suit awarded in courts of Maryland - - - -	1,017 77	
		1,350 82
To construction of the canal. Received for materials sold the penitentiary - - -	82 20	
To construction of the canal. Received of G. H. Smoot, for		

	Dolls. cts.	Dolls. cts.
Bank of the Metropolis -	81,338 98	
Patriotic Bank - -	201,640 71	
Bank of Alexandria - -	449 89	
Bank of Potomac - -	56,244 15	
Farmers and Mechanics' Bank	95,789 87	
Office Valley Bank, Charleston - - - -	212 63	
Office Valley Bank, Leesburg	144 50	
Hagerstown Bank - -	193 58	
		508,532 62

ABSTRACT—Continued.

	Dolls. cts.	Dolls. cts.		Dolls. cts.	Dolls. cts.
rent of saw mill at the Great falls - - -	75 00				
		157 20			
To Engineer Department. Received of Baltimore and Ohio Railroad Company, for costs of survey awarded in courts of Maryland - - -	-	2,500 24			
		3,337,800 51			3,337,800 51

C. SMITH, *Treasurer.*

TREASURER'S OFFICE, CHESAPEAKE AND OHIO CANAL COMPANY, *Georgetown, May* 3, 1833.

NOTE.—The tables of the work done, and the sums paid therefor, have been delivered to the engineers of the United States, appointed by the Secretary of War to inspect the canal, and have not yet been returned.

A letter from the undersigned members of the House of Representatives to the President of the United States, dated

WASHINGTON, *March* 2, 1829.

SIR: The undersigned, members of the House of Representatives, duly impressed with the importance of uniting, by the closest ties of intercourse, those portions of the United States which are at present divided by continued chains of lofty mountains, and especially the extensive slopes descending from the Alleghany, westwardly, towards the Mississippi, and the Gulf of Mexico, and, eastwardly, to the Atlantic; and understanding that, by the existing laws, the soldiers of the regular army may be employed on works of public utility, beg leave to recommend to your consideration the expediency of concentrating, near the proposed tunnel for uniting the waters of the Chesapeake and the Ohio, a portion of the army; and of directing its labor, under the inspection of skilful engineers, first, in sinking the necessary air and working shafts for constructing the said tunnel, and, next, in completing the same in the shortest practicable period.

The labor which these works would require of the troops bears a peculiar analogy to some of the most difficult, and, in Europe, the most frequent operations of war; while the instruments employed in them are such as impart additional strength to the arm of the soldier, and render him more formidable to his enemy.

If objections were made to the subterranean character of the labor, on the score of health, an answer to them would be found in the unremitting vigor and cheerful alacrity with which the hands engaged on the coal mines of James river perform their daily tasks, in pits sunk below the level of tide water. The proposed tunnel; on the contrary, will be rendered, by its great elevation above the adjacent valleys of the Alleghany, both dry and healthful.

A force not exceeding one thousand men, stationed as is here proposed, would greatly accelerate the completion of the tunnel; while its position, during the continuance of its useful labor, would render it as efficient for the public defence, as if it were distributed as at present, where its labor as the undersigned have been credibly informed, is often misapplied.

The distance from the tunnel to the navigable waters of the Potomac does not exceed thirty-one miles, and to the Monongahela, seventy; while access to both is opened from Smithfield, by the Cumberland road, at a distance not exceeding forty miles from either.

To supply the troops employed in the service with an incentive to labor, with greater alacrity, the undersigned have no doubt but that, if their recommendation shall accord with the views of the Executive Department, the Congress would increase the compensation now allowed for extra labor; and the more readily, as the motives to desertion, which now thin the ranks of the army, would be diminished by the enhanced compensation of the soldier, the wholesome occupation given him, and the absence of all countervailing temptations to dissipation and excess.

The undersigned are aware that the authority to construct the proposed work has been expressly vested in the Chesapeake and Ohio Canal Company, by their charter—itself a compact between the United States and the States of Virginia, Maryland, and Pennsylvania; but they are well assured that an arrangement might be made with that company, alike be-

neficial to their interest, and the great and useful end which the undersigned have in view, as to the general health and efficiency of the army.

The undersigned are also apprised that doubts exist as to the expediency of crossing the Alleghany, in the proposed route, by a canal or railway; and, accordingly, that authority has been granted to the Chesapeake and Ohio Canal Company, by an early amendment of their charter, to effect their passage across this formidable barrier in either mode. The construction of the tunnel, by overcoming a rise and fall of 1,700 feet in the short compass of four miles, would prove, however, alike beneficial to either of these modes of communication between the Eastern and Western waters.

It is not designed, by a special recommendation of the proposed work on the Alleghany, to limit, in any respect, the Executive discretion, to which, the employment of the troops, on useful public enterprises, is confided by the laws. The undersigned believe that the efficiency of the army in war, apart from the valuable military use of the works which it may construct, would be promoted by a judicious application of its labor in peace.

We have the honor to be, with great respect, your obedient servants,

John Kincaid,
T. Beekman,
H. R. Storrs,
J. C. Isacks,
John Davis,
S. Pettis,
John Test,
S. A. Smith,
Innis Green,
James Ford,
R. M. Johnson,
A. C. Martindale,
John Blair,
A. H. Sevier,
Thomas Chilton,
P. L. Tracy,
J. Richardson,
James L. Hodges,
John Thomson,
Lewis Maxwell,
George Grennell, jr.
William L. Storrs,
Joseph G. Kendall,
Timothy Childs,
Richard Spencer,
Joseph Duncan,
Robert S. Rose,
Edward B. Dudley,
Lewis Williams,
W. B. Shepard,
Joseph M. White,
Jonathan Hunt,
D. L. Barringer,
Robert Craig,
Dutee J. Pearce,
Edmund Deberry,
Horace Everett,
Richard M. Cooper,
C. F. Mercer,
B. I. Semmes,
Harmar Denny,
John Bailey,
P. Doddridge,
John D. Dickinson,
E. F. Norton,
John Varnum,
Thomas Irwin,
Wm. McCreary,
Thomas H. Sill,
George C. Washington,
John Gilmore,
C. Forward,
J. B. Sutherland,
William Armstrong,
M. C. Sprigg,
D. H. Miller,
R. C. Mallary,
Samuel Swann,
Tristam Burges,
Clement Dorsey,
W. Ramsey,
David Crockett,
Philander Stephens,
Robert P. Letcher,
Elisha Whittlesey,
Lewis Condict,

James Clark,
Joseph H. Crane,
Isaac Pierson,
M. Bartley,
H. B. Cowles,
H. Daniel,
Thomas H. Hughes,
William Stanberry
William Creighton, jr.
Robert E. B. Baylor,
William Kennon,
J. Hawkins.

ACT OF THE STATE OF MARYLAND.

An act to provide for the continuation of the Baltimore and Ohio railroad to Harper's Ferry, and for other purposes.

SEC. 1. *Be it enacted by the General Assembly of Maryland,* That the Baltimore and Ohio Railroad Company be, and it is hereby, authorized to subscribe for twenty-five hundred shares of the stock of the Chesapeake and Ohio Canal Company, and to pay, whenever the Baltimore and Ohio Railroad shall be completed to Harper's Ferry, upon the terms hereinafter stipulated, such proportion of said stock as shall be proportionally equal to the amount which shall, at that time, have been paid on the stock held by the State in the said Canal Company; the balance of the stock so subscribed by the said Railroad Company, to be paid as the capital stock generally of the said Canal Company shall be called in and paid.

SEC 2. *And be it further enacted,* That whenever the Baltimore and Ohio railroad shall be completed, upon the terms hereinafter stipulated, to Harper's Ferry, the assent of this State be, and the same is hereby, given to an act of the General Assembly of the State of Virginia, entitled "An act further to amend an act incorporating the Chesapeake and Ohio Canal Company, which passed the twenty-seventh February, eighteen hundred and twenty-nine, and to another act of the same State, entitled "An act to amend the charter of the Chesapeake and Ohio Canal Company, by authorizing the commencement of the western section of the canal, which passed February thirteenth, eighteen hundred and thirty: *Provided,* That in the exercise of the powers conferred upon the Chesapeake and Ohio Canal Company, by the first of those acts, of selling or otherwise disposing of surplus water, an absolute sale shall, in all cases, be made of such surplus water, by conveyance, in writing: *And provided, also,* That the said Chesapeake and Ohio Canal Company shall not, at any time, or at any place, be authorized to sell or dispose of surplus water, when such shall, by diminishing the quantity of water in the bed of the river, injure the water rights of any individual whatsoever; and no part of the said surplus water authorized to be disposed of by the said act, shall be applied any where within this State to the manufacture of any species or description of grain: *And provided, also,* That the tolls charged on the said canal for the transportation of flour, meal, or other manufactured grain, shall be the same, weight for weight, with the tolls charged for the transportation of unmanufactured grain.

SEC. 3. *And whereas* the Baltimore and Ohio Railroad Company are desirous to extend their road up the north side of the Potomac river as far as Harper's Ferry, and the State of Maryland being deeply and equally interested in the successful prosecution of the Baltimore and Ohio railroad, and the Chesapeake and Ohio canal, and believing that the successful prosecution of the Baltimore and Ohio railroad will depend upon its being

permitted, by the Chesapeake and Ohio Canal Company, to pass at and near the Point of Rocks to Harper's Ferry: *Be it therefore further enacted*, That the special grants made by the first and second sections of this act be, and the same are hereby, made on the following conditions, and with the following restrictions:

1. That the Railroad Company shall be permitted by the Canal Company, as soon as the canal shall be completed, that is, by the tenth day of May next, between the Point of Rocks and Harper's Ferry, to extend their railroad with a breadth of twenty feet through the difficult passes of the Potomac, from the Point of Rocks to Harper's Ferry, and that the Canal Company, in the interim, shall so conduct their work at each of these passes as not to augment the difficulty of constructing the railroad, with the breadth aforesaid, along the upper side of the canal through those passes.

2. The difficult passes here meant are the four passes called the Lower Point of Rocks, the Upper Point of Rocks, Miller's narrows, and Harper's Ferry narrows, as far up the same as the present bridge over the Potomac, and their length is the same as that reported by the engineers, Nathan S. Roberts and Jonathan Knight, in the proceedings in the Court of Chancery of Maryland, in the suit depending in that court, in which the Baltimore and Ohio Railroad Company were the complainants, and the Chesapeake and Ohio Canal Company were the defendants; and in these passes the canal shall be reduced in breadth, where there shall be a necessary or unavoidable interference between the canal and railroad, to fifty feet at the water surface; and the railroad, as before stated, to twenty feet; the reduction of the former to be effected where, in those passes, the breadth of the canal exceeds fifty feet, by subtracting from the said breadth at the lower side of the canal; but where such interference does not extend to necessary impracticability to construct the railroad of the breadth of twenty feet, and a greater breadth has already been given to the canal than fifty feet at the water surface, the breadth of the latter shall not be reduced: *Provided*, That if, in the opinion of the board of commissioners to be appointed as hereinafter to be provided, and who are required to report upon the subject as soon as practicable after their appointment, the graduation of the said road at the passes aforesaid would exceed the sum of $100,000, the canal retaining a width of fifty feet, then the said commissioners shall determine what reduction in the width of the said canal, not reducing it in any event to less than forty feet in width, may be necessary to make the cost of graduating the said road in the said passes equal to the sum aforesaid; and shall report a plan of such reduction in width to the two companies respectively; and such plan shall be followed in the reduction of the width of the canal, and in the construction of the said railroad by the said Railroad Company. Or should the Canal Company desire to retain the width of fifty feet for the said canal, notwithstanding any report of the said commissioners, they shall be permitted to do so, provided that they shall graduate the said road at the passes aforesaid, agreeably to a plan to be approved by the said board of commissioners, within six months after such plan shall have been furnished and approved by the said board; and the said Railroad Company shall pay to the said Canal Company, for such graduation, as the work proceeds, such sums, and at such times, as the board of commissioners may direct and appoint in proportion to the sum of $100,000; which sum of $100,000, when paid by the said Railroad Company, shall be in full satisfaction for such graduation—the said graduation

to be approved and accepted by the said board of commissioners. And further, it is hereby provided that the railroad shall be considered as constructed according to the terms of this provision, if no curve be required therein of a less radius than four hundred feet, and if no deviation from a horizontal line be required to adapt the road to these passes exceeding thirty feet per mile.

3. The railroad may be commenced on the line before described, at all places between the narrow passes aforesaid, where it can be done without interfering with the ground occupied by the present contractors, and with their consent, at all places whatever, so soon as this act shall have been accepted by both companies. In its construction at and through the narrow passes aforesaid, after the canal shall have been opened, three feet water shall be allowed to be and remain at all times in the canal, except when it may be necessary to lay and carry up to that height the foundation walls along the lower side of the railroad; and if the Canal Company shall, prior to the opening of the navigation, make such foundation, and carry up to that height the dry walls aforesaid required to sustain the road next the canal, it shall have power to do so, and shall receive for such work the price which the Canal Company may have paid for the same, according to the usual cost of such work. And during the construction of the said railroad, the Railroad Company shall make every reasonable and proper effort to guard against injury to the canal, or any of its works; and shall cause to be removed, as speedily as practicable, any stone, earth, or other material which their contractors or agents may throw, or occasion to fall therein, in constructing the railroad, to the impediment or obstruction of the navigation of the canal, after the same shall have been opened; and shall keep open and free from obstruction a space wide enough for the passage of a canal boat, next the towpath of the canal, if practicable.

4. In the location of the railroad, at all places or portions of the above line, it shall be removed as far as practicable from the line of the canal, without increasing the curvature of the road beyond the radius of four hundred feet, and the inclination above thirty feet per mile, so as to prevent, in all cases, the locomotive engines from frightening the horses or mules tracking the canal boats; and when so near an approach is made to the canal by the road as to endanger such consequences, and especially in the narrow passes aforesaid, the Railroad Company shall, prior to the introduction of any locomotive engines on such part of said road, cause to be erected within or upon the margin of their road next the canal, or within the canal adjoining the partition wall, a close fence of boards of a sufficient elevation to prevent such locomotive engines from alarming the horses or mules tracking the canal boats; the said fence shall be kept up in good repair at all times thereafter by the said Railroad Company, so long as locomotive engines may be employed on the said road; and for any damage or injury which may result or happen to any person, by reason of a neglect to keep up such fence in all places where the same may be necessary, the Railroad Company shall be responsible to the full extent of the damage or injury done to the person or owner of the property sustaining the same: *Provided*, That, while ample security be afforded the horses or mules tracking the canal coats, the fence shall, in all other respects, be so constructed as to save the Railroad Company any injury therefrom.

5. And in the location and construction of the said road, the Railroad Company shall construct, wherever it may be required by the Canal Com-

pany, passways across the railroad to the berm side of the canal, and shall especially locate and construct their road so as not to impede or impair the convenient use by the proprietors of the adjacent lands, the Canal Company, and the public, of the several viaducts already constructed under the canal, or the intended passways and roads across it by ferries or pivot bridges.

6. And whereas in all cases where the railroad unavoidably approaches very near to the canal, it may obstruct the free access to the opposite side thereof, for stone to wall hereafter the inner slopes of the canal, and for materials of stone, earth, or wood, to repair the same, in case of breaches in its banks, it is especiallly provided, that, in the former case, the Canal Company shall have access for these purposes to the quarries on the opposite side of the road, after the road shall have been completed : *Provided*, That, in working the same, they do not obstruct the use of the railroad; and in case of breaches in the canal within or opposite to such narrow passes, the said Railroad Company shall permit the removal of any fence alongside the railroad, to enable the Canal Company to reach the necessary materials for such repairs; and it shall allow also the use of so much of their road as shall be necessary for the transportation of stone, earth, or timber, for the repair of such breaches, free of cost to the Canal Company, till the same shall have been repaired; when the Canal Company shall replace, at their own proper cost, such removed fences, in the condition in which they found them prior to such repairs of the canal; and, in making such repairs, use only the track, if there be two tracks, next the canal, and in such manner as not to interrupt or prevent the use of the other track, at the same time, by the Railroad Company; and with this instruction the Canal Company may, in such cases, if they prefer so doing, erect a temporary cover over the upper track of the railroad, for the purpose of obtaining, without impairing or obstructing the use of that track, convenient materials of stone, earth, or timber, from the adjacent or opposite country, for the repairs of the canal; and at such times as the Canal Company may find it necessary to use the lower track of the said railroad for such repairs, the Railroad Company shall furnish, from the nearest depot or station at which they may be procured, such cars, at a reasonable price, for the use thereof, as may be needed for the transportation of the said materials; the cars to be returned in as good order, if practicable, as when received, and any injury which they may have unavoidably sustained, repaired or paid for by the Canal Company.

7. And if the Canal Company should be kept out of use in any part of it, after the section to Harper's Ferry shall have been completed, or delayed in its completion to that place, by and during the construction of the railroad, the Canal Company shall be indemnified for any injury or loss of profit therefrom, either above or below Harper's Ferry, by the Railroad Company. And if the two companies cannot agree on the amount of indemnity, then its amount shall be ascertained, at the choice of the Canal Company, either by arbitrators, one to be appointed by each company, with power to call in an umpire in case of difference, or by the board of commissioners to be appointed as hereinafter provided; the award of the said arbitrators or commissioners to be final between the parties; and the Baltimore and Ohio Railroad Company shall not occupy the Maryland shore of the river Potomac above Harper's Ferry, where they shall have liberty to cross the canal by the pivot bridge now erecting by the Canal Company thereat, or

by another pivot bridge constructed at an elevation above the surface of the canal, not less than that of the aforesaid pivot bridge, or in such other manner as the Board of Commissioners hereinafter mentioned shall deem most expedient, consistently with the perfect and unimpeded use of the canal in the most advantageous manner for it.

8. There shall be a Board of Commissioners, to be appointed immediately after the mutual acceptance of this act, consisting of an engineer appointed on the part of each company; and, in case of their disagreement, they are to have the power to appoint such third person or engineer as they may select; or, in the event of their non-concurrence in such selection, and the report thereof to their respective companies, such third person or engineer shall be appointed by the President of the United States, at the request of the two companies, or, should one of the companies refuse or neglect to join in such request, at the request of the other of them, who shall perform the duties hereinbefore indicated, and shall act as arbitrators under oath or affirmation, to decide truly and without partiality between the parties in all differences that may arise between the said companies, in carrying into operation the plan here contemplated for the construction of said railroad, from the Point of Rocks to Harper's Ferry; and whose decision, upon all points submitted to them, shall be final between the said companies.

Sec. 4. The assent of the two companies to the preceding act shall be communicated by both companies, under their corporate seals, and the signatures of their Presidents and Directors, respectively, to the Governor of Maryland, on or before the 10th day of May next: *Provided*, that neither of the said companies shall derive any benefit from the provisions of this act, unless both of the said companies shall signify their assent thereto, as aforesaid.

Sec. 5. This act shall continue and be in force from and after the passage thereof.

We certify that the foregoing is a true copy of the original bill, which passed both branches of the legislature of Maryland, at December session, eighteen hundred and thirty-two.

Given under our hands, at Annapolis, this twenty-third day of March, eighteen hundred and thirty-three.

GEORGE G. BREWER,
Clerk House Delegates, Maryland.
JOSEPH H. NICHOLSON,
Secretary Senate, Maryland.

Extract from the minutes of the proceedings of the President and Directors of the Chesapeake and Ohio Canal Company, had May 7, 1833.

The President of the company, from the committee appointed on the 6th ultimo, to confer with the committee of the Baltimore and Ohio Railroad Company, made the following report:

The committee appointed, by the order of the Board of the 6th of April last, to confer with a committee of the Board of Directors of the Baltimore and Ohio Railroad Company, have performed that duty; and, after several

conferences with that commiitee, as well in Washington as on the line of the canal, and in the city of Baltimore, beg leave to recommend to the President and Directors the annexed terms of compromise, in lieu of the 1st section of the act of the General Assembly of Maryland, entitled "an act to provide for the continuation of the Baltimore and Ohio Railroad to Harper's Ferry, and for other purposes," and of sundry conditions contained in the act; which, in all other respects, except the modifications thereof, contained in the annexed terms, is left unchanged.

The committee deem it unnecessary, if not inexpedient, to enter into a narrative of the various opinions expressed by themselves or the committee of the Railroad Company in the progress of their negociation; but avail themselves of this occasion, to do justice to the candor which marked the course of the committee of the Railroad Company, and to express a hope, which the assurances of those gentlemen, composing that committee, tended to confirm, that, if the proposed arrangement shall meet the approbation of both companies, the harmony, which it is so desirable to establish and preserve in their future progress, will be restored to their mutual benefit.

C. F. MERCER,
W. GUNTON,
W. SMITH.

The Chesapeake and Ohio Canal Company and the Baltimore and Ohio Railroad Company, by their respective committees, covenant and agree to the following terms of compromise, subject to confirmation or rejection by their respective companies:

1st. To accept the act of the General Assembly of Maryland, entitled "An act to provide for the continuation of the Baltimore and Ohio Railroad to Harper's Ferry, and for other purposes," within the time limited by the said act for the acceptance thereof by both companies, so as to secure to each its intended benefits. And as the purpose which the Legislature of Maryland had in view in passing the same, will be more effectually attained by a modification of some of its conditions, the said companies mutually and reciprocally covenant and agree, in the event of such acceptance by both, faithfully to fulfil the conditions hereinafter inserted for their common benefit, and so far to modify those stipulated in their behalf by the act aforesaid, viz.

The Baltimore and Ohio Railroad Company, in consideration of the damage that may be done the canal, and of the interruption or hazard to which its navigation will be unavoidably exposed, in the construction of the railroad along the margin thereof, bind themselves to pay to the Chesapeake and Ohio Canal Company, for grading the four miles and one-tenth of the road between Harper's Ferry and the Point of Rocks, hereinafter described, the sum of two hundred and sixty-six thousand dollars. The said four miles and one-tenth of road shall consist of a space to be laid off between the entrance of the bridge at Harper's Ferry, and a point two miles therefrom, according to the location of the said road, which point will be below Millar's Narrows, of one mile and one-twentieth, extending from a point opposite to the door of the chief public house, at the Point of Rocks up the valley of the Potomac, comprehending the Lower Point of Rocks; and of one other mile and one-twentieth, extending above and below the Upper Point of Rocks, so as to comprehend the same; embracing

all that part of the canal border at those places in which an interference exists between the location of a canal and railroad. In making as well as locating the said road, the Chesapeake and Ohio Canal Company shall act in conformity with their own judgment, subject to the conditions, as to the curvature, inclination of surface, and the breadth of the said road, which the act of the General Assembly of Maryland prescribes; except that so much of the said road as is expected to be hereafter common to the Frederick and Harper's Ferry Turnpike Company and the Railroad Company, shall be of the breadth, at the surface, of not less than thirty feet, instead of twenty, for the better accommodation of both these companies.

Should the canal company prefer it, they may begin the lowest section of the said road at any elevation opposite the tavern at the Point of Rocks, not exceeding four feet above that of the road now constructed at that place; and, in case of a change of the present elevation, the expense of raising the present road and its appurtenant fixtures so as to adjust the same to the road below, and to its extension above, shall be at the cost of the railroad company, and shall be done at such time as they may please to direct: Provided, however, that at the lower termination of the pass, through Millar's Narrows, above mentioned, at both terminations of the pass by the Upper Point of Rocks, and at the upper termination of the pass by the Lower Point of Rocks, the Baltimore and Ohio Railroad Company may, if they please, in fixing the elevation of these points, or termini, unite an engineer of their own appointment with the engineer of the canal company charged by the same to make the location thereof, so as to adjust those points to the intermediate railroad, according to the terms of the said act of the General Assembly of Maryland; and the canal company may, in like manner, unite their engineer with the engineer of the railroad company in fixing the intermediate location of the rail-road according to the said terms.

In the construction of the graduated road aforesaid for the four miles and one-tenth before mentioned, and in satisfaction of all injuries that may be done the canal in the construction of the said road, and as indemnity for any injuries that may be done the navigation thereof, during the construction of the said road, payments of the $266,000 shall be made monthly by the said railroad company in the following proportions, viz. one-twelfth part thereof on the first day of June next, and one-twelfth part on the first day of each of the following months, until the said graduation shall be completed; but if the same be completed earlier than the twelve months allowed therefor, the residue unpaid at the time of such completion shall be paid on the first day of the month next ensuing the same.

The passage to the Harper's Ferry bridge, across the canal, from the railroad, shall be by a pivot, or drawbridge, the expense of attending which shall be equally divided between the two companies, and the elevation of which above the bottom of the canal shall remain, as at present adjusted, at three feet above the bridge across the Potomac, unless it be hereafter the pleasure of the railroad company to elevate it still higher. And the curves of the road at the entrance of the defile or pass at the Point of Rocks, and at the crossing of the said point or drawbridge, being not provided for by the act of the General Assembly of Maryland, shall be adjusted to the residue of the road as conveniently as can be done in the graduation of the railroad by the canal company.

All expenses to be incurred in condemning or purchasing ground or ma-

terials for the location and graduation of the railroad through the four and one-tenth miles aforesaid, shall be, as at all other places where the land required is not now the property of the canal company, at the proper cost of the railroad company; and where the said road shall occupy ground now the property of the canal company, the railroad company shall obtain and convey to the canal company an equivalent breadth of ground along the northern side of the railroad for the future supply of materials to the canal.

It is already herein provided that the portion of the railroad at Harper's Ferry narrows, shall be thirty feet in width, for the common use of the Harper's Ferry and Frederick turnpike and the railroad companies. The canal company will allow the use, by the railroad company, of any authority which they possess, to obtain permission from the turnpike company, to the railroad company, to lay their rails on the part of the said road common to both, the canal company being bound by their articles of agreement only for the graduation of the said road from the Harper's Ferry bridge down to the point at which the said turnpike will diverge from the railroad to ascend the hill above Millar's Narrows; and the railroad company shall also adjust the surface of that bridge to the elevation of the pivot bridge across the canal at their own cost.

The railroad company agrees not to continue the railroad further up the valley of the Potomac than Harper's Ferry, until the Chesapeake and Ohio canal shall be completed as far as Cumberland, provided that the canal be completed thereto within the term allowed by the charter of said canal company.

The period of twelve months from the date of the acceptance of these articles of compromise, shall be allowed the canal company to complete the graduation of the four miles and one-tenth of railroad before described; but the president and directors of the canal company shall urge the contractors who may undertake the same to proceed with diligence, and to complete the graduation in the shortest time practicable, consistently with the health of the country.

In case of any possible difference of opinion, or disagreement, between the two companies, in relation to the construction of these articles of compromise, such difference or disagreement shall be settled in the mode provided by the act aforesaid, for the settlement of the construction thereof, by the same parties.

The report having been read and considered, was accepted and approved.

The president submitted the form of a report of the board to the stockholders about to assemble in general meeting this day, which was read and approved, and he was requested to present the same in behalf of the board to the stockholders.

REPORT.

Report to the stockholders of the Chesapeake and Ohio Canal Company, in general meeting.

The president and directors beg leave respectfully to submit, along with a copy of the act of the General Assembly of Maryland, in pursuance f which the present general meeting has been convened, a report, approv d

by them, of a committee of their board appointed to confer with a committee of the board of directors of the Baltimore and Ohio Railroad Company.

By order, and on behalf of the president and directors.

C. F. MERCER,
President of the Chesapeake and Ohio Canal Company.

CANAL OFFICE, WASHINGTON, *May 7*, 1833.

Copy test. JOHN P. INGLE,
Clerk C. & O. C. C.

Extract from the journal of the stockholders of the Chesapeake and Ohio Canal Company of May 9, 1833.

Resolved, That the consent of this company be, and is hereby given to the act of the General Assembly of Maryland, passed at December session, 1832, entitled "An act to provide for the continuation of the Baltimore and Ohio railroad to Harper's Ferry, and for other purposes;" and that the president and directors of this company shall certify their assent to the Governor of the State of Maryland, in conformity to the provisions of said act.

Whereas, it has been represented to this meeting, that the stockholders of the Baltimore and Ohio Railroad, in general meeting, held on the 8th day of May instant.

"*Resolved*, That the President and Directors of said Company be clothed with full power and authority to make and execute, on the part of the said company, such agreement in the premises with the Chesapeake and Ohio Canal Company, as to them should appear expedient and proper." And whereas, a committee of the directors of each of said companies did recommend the adoption of certain conditions, stipulations, and agreements, as hereinafter mentioned; and that the President and Directors of the Baltimore and Ohio Railroad Company, did afterwards, viz: on the day aforesaid, resolve to agree, and did agree, to each and every of the conditions, terms, and stipulations specified and contained in a report made to them by a committee of that body, which had been appointed to confer with a committee acting on behalf of this company, of the terms on which an agreement could probably be made in the premises between the two companies, and which terms are contained in the report of the President and Directors of this Company to the stockholders thereof, viz: (for terms see pages 25, 26, & 27.)

Therefore, be it resolved, That the assent of the Chesapeake and Ohio Canal Company be, and is hereby given to each and all of the conditions, stipulations, and provisions specified and contained in the said report, and that a copy of the proceedings shall be made and delivered to the said Baltimore and Ohio Railroad Company, in evidence of the assent of the company to said conditions, stipulations, and provisions, as an agreement, and in exchange for a counterpart of said agreement to be furnished by the said Railroad Company.

The foregoing resolutions were adopted by the following vote: Ayes, 6,904, Noes, 1,300,

Test: JOHN P. INGLE, *Secretary of meeting.*

Extract from the Journal of Proceedings of the President and Directors of the Chesapeake and Ohio Canal Company, May 9, 1833.

The President communicated to the board the following resolution, adopted this day by the stockholders of the Chesapeake and Ohio Canal Company, in general meeting:

Resolved, That the assent of this company be, and is hereby given to the act of the General Assembly of Maryland, passed at December session, 1832, entitled "An act to provide for the continuation of the Baltimore and Ohio Railroad Company to Harper's Ferry, and for other purposes," and that the President and Directors of this company shall certify this assent to the Governor of the State of Maryland, in conformity to the provisions of said act.

Whereupon, the President and Directors signed and sealed a certificate to the Governor of Maryland, giving the assent of the Chesapeake and Ohio Canal Company to the said act of Maryland, according to the provisions thereof, and the President was requested to transmit the same to the Executive of Maryland.

The President also communicated to the board certain proceedings of the stockholders of the company of this date, adopting the terms of compromise, with the Baltimore and Ohio Railroad Company, as contained in the report of the President and Directors to the stockholders on the 7th instant.

The President was requested to deliver to the Baltimore ond Ohio Railroad Company, an attested copy of the said proceedings of the stockholders, under the seal of the company, in exchange for an attested copy of the proceedings of that company of the 8th instant, in relation to the said compromise.

Attest: JOHN P. INGLE,
Clerk Ches. and Ohio Canal Company.

His Excellency, JAMES THOMAS, *Governor of Maryland.*

SIR: I have the honor to avail myself of the good offices of Mr. McCullough, of Baltimore, one of the Representatives of Maryland, in the late general meeting of the stockholders of the Chesapeake and Ohio Canal Company, to transmit to you, within the time prescribed by the act of the last General Assembly, "to provide for the continuation of the Baltimore and Ohio Railroad, and for other purposes," evidence of the acceptance of that act by the Chesapeake and Ohio Canal Company.

Mr. M. being also the bearer of the acceptance of the same act, by the Baltimore and Ohio Railroad Company, I may, I trust, congratulate your Excellency, and the friends of internal improvement in Maryland, on this propitious removal of the recent bar to their friendly union, in advancing the prosperity of your flourishing commonwealth.

I have the honor to be, sir,
With great respect, &c.
C. F. MERCER,
Pres. of the Chesapeake and Ohio Canal Co.

Extract of a letter from the President of the Baltimore and Ohio Railroad Company to the President of the Chesapeake and Ohio Canal Company, dated 24th May, 1833.

"I have now the pleasure to enclose to thee a copy of some resolutions which passed the Board of our Railroad directors, upon the reception of the ratification of the late agreement. I have entire confidence that this manifestation of good feeling will be received by the canal company, in the same friendly spirit which led to the adoption of these resolutions; and I trust that no circumstance will ever again occur to interrupt the harmony now happily restored between the two companies.

The funds are ready for the payment of our June instalment, under the existing agreement between the two companies, and the amount, say $22,333 33, may either be drawn for, payable on the first day of June, or the payment will be made in any other manner directed by thee."

At a meeting of the President and Directors of the Baltimore and Ohio Railroad Company,

MAY 18, 1833,

The President having laid before the board a copy of the ratification on the part of the Chesapeake and Ohio Canal Company, and on the part of the Baltimore and Ohio Railroad Company, of the terms of agreement entered into between these companies, for the extension of the railroad on the north side of the Potomac river, from the Point of Rocks to Harper's Ferry, and for its passage over that river, and the same being read, it was, on motion,

Resolved, That, as all causes of future unfriendly collisions between these works are now removed, and as the canal and railroad will, hereafter, from their relative positions, necessarily become reciprocally beneficial to each other, it is therefore the mutual interest of both companies to extend to each other every friendly aid and co-operation.

Resolved, That as the completion of the canal to the coal mines, in Alleghany county, as early as practicable, is not only demanded by the public interest, but would also materially benefit the railroad, by furnishing a supply of coals, and by affording, in connexion with this road, an extended channel of communication to the westward, by which the transportation through the canal and railroad, in both directions, would be greatly increased, this board will cordially unite with the President and Directors of the Chesapeake and Ohio Canal Company in all proper measures calculated to promote these works, and will, in a spirit of sincere good will, be prepared harmoniously to co-operate with them to effect the same.

Resolved, That the President of this company forward to the President of the Chesapeake and Ohio Canal Company a copy of the foregoing resolutions, signed on behalf of this Board.

Extracted from the minutes of the Board, and signed on behalf thereof.

P. E. THOMAS,
Pres. Balt. and Ohio Railroad Co.

Extract from the proceedings of the President and Directors of the Chesapeake and Ohio Canal Company of June 4, 1833.

The President laid before the Board a letter, of the 24th May, which he intimated that he had just received from the President of the Baltimore

and Ohio Railroad Company, covering certain proceedings of the President and Directors of that Company of the 18th of May last.

Whereupon, *it was resolved, unanimously,* by the President and Directors of the Chesapeake and Ohio Canal Company, that they cordially unite with the President and Directors of the Baltimore and Ohio Railroad Company, in the liberal sentiments expressed by them in their resolutions of the 18th of May, and that they will seek, by all proper means, to preserve the harmony which has been so happily established between their companies.

And be it further resolved, That the President of this Company forward to the President of the Baltimore and Ohio Railroad Company a copy of the preceding resolution, signed on behalf of this Board.

Extracted from the minutes of the Board, and signed on their behalf.

C. F. MERCER,
Pres. of the Ches. and Ohio Canal Co.

Copy of a letter from the President of the Chesapeake and Ohio Canal Company to the President of the Baltimore and Ohio Rail Road Company

CANAL OFFICE, CITY HALL, WASHINGTON, *June* 4, 1833.

DEAR SIR: I take peculiar pleasure in becoming the medium for communicating, through you, to your Board the enclosed resolution, and avail myself of the occasion to renew to you the assurance of my high respect.

Your obedient servant,
C. F. MERCER, *President*

To PHILIP E. THOMAS, Esq.
President of Balt. & Ohio Railroad Com.

Extract from the minutes of the proceedings of the President and Directors of the Chesapeake and Ohio Canal Company, had May 4, 1833.

Resolved, That the President of the company be requested to make known to the honorable Secretary of the Treasury, that sixty-four miles of the Chesapeake and Ohio Canal are expected to be completed, and brought into active use, in the course of this month; and that thirty-eight miles are under contract; and that the Board respectfully submit to the honorable Secretary the expediency of causing, on behalf of the United States, an inspection of the said work.

Attest: JOHN P. INGLE,
Cl'k. Ches. & Ohio Canal Co.

CANAL OFFICE, CITY HALL, WASHINGTON, *May* 8, 1833.

SIR: Pursuant to the request of the President and Directors of the Chesapeake and Ohio Canal Company, I beg leave to transmit to you the enclosed resolution, and to add, that the engineers and officers of the company are in readiness to afford every aid in their power to further the proposed inspection of the works of the canal, referred to in the resolution.

I have the honor to be, sir, respectfully, your obedient servant,

C. F. MERCER,
Pres. of the Ches. & Ohio Canal Co.

Hon. LOUIS MCLANE,
Secretary of the Treasury.

TREASURY DEPARTMENT, *June* 1, 1833.

SIR: Your letter dated the 8th of May, and the copy of the resolution which accompanied it, were duly received.

Captain McNeill, of the topographical engineers, having been designated for that purpose, is prepared to make the inspection suggested.

I remain, very respectfully, your obedient servant,

W. J. DUANE,
Secretary of the Treasury.

C. F. MERCER, Esq.
President of the Chesapeake & Ohio Canal Co.

WASHINGTON CITY, *June* 1, 1833.

SIR: In pursuance of the instructions of the honorable Secretary of War, I shall proceed, on as early a day as practicable, to make such an inspection of the Chesapeake and Ohio Canal, as shall be enjoined by those instructions; and as it would be not less promotive of the object in view than agreeable to me, to be accompanied by some one or more of the agents of the company conversant with the work, I hope it may be so arranged, that I may be accompanied by your engineer, Mr. Cruger. My wish is to leave this on Monday or Tuesday next, at farthest. My address, sir, is at the Topographical Bureau, War Department.

Very respectfully, I have the honor to be, your obedient servant,

WM. GIBBS McNEILL, *Captain Top. Eng.*

To Gen. MERCER,
Pres. of Ches. & Ohio Canal Co.

WASHINGTON, *June* 1, 1833.

SIR: I have this day received your letter of the above date. Without awaiting the further order of the Board under whose instructions I act, I have written to Mr. Cruger to direct his attendance on you in the inspection which you have been instructed, by the Secretary of the Treasury to make of the Chesapeake and Ohio Canal.

Mr. Cruger is probably now at Harper's Ferry where he keeps his office; and as you may deem it expedient to avoid delay, by meeting him, where the work, not hitherto inspected by an engineer of the United States, commences, I also enclose, for your use, the within letter.

Mr. Cruger's agency, as resident engineer of the canal, terminates at Shepherdstown, or opposite to it. I, therefore, transmit, with the letter to him, one for Mr. Purcell, who is the resident engineer of the residue of the canal now under contract for construction.

I have the honor to be, sir, very respectfully, your obedient servant,

C. F. MERCER,
Pres. of the Ches. & Ohio Canal Co.

Capt. WILLIAM GIBBS McNEILL.

WASHINGTON, *June* 1, 1833.

SIR: Since writing the enclosed, I have requested Mr. Cruger, provided he receives my letter, by mail, prior to that which I have enclosed for you, to come down towards this district, along the tow-path of the canal; which, if you adopt, what I think you will find to be the best mode of inspecting the work, a ride on horseback, you will discover to be the most agreeable mode of reaching Harper's Ferry. In that case, you will meet Mr. Cruger on his way down, or be sure, if you remain here, of his speedy arrival, unless some accident prevents my letter from reaching him.

I have the honor to be,
Sir, very respectfully,
Your obedient servant,
C. F. MERCER,
Pres. of Ches. and Ohio Canal Co.

Capt. WILLIAM GIBBS MCNEILL.

CANAL OFFICE, WASHINGTON, D. C. *June* 1, 1833.

SIR: Captain William Gibbs McNeill, who will deliver to you this letter, has been instructed, as he apprises me, to proceed, on as early a day as practicable, to make an inspection of the Chesapeake and Ohio Canal; in the performance of which duty, he desires to be accompanied by an agent of the company conversant with the work, and wishes it to be so arranged as that you may be selected for that purpose.

You will, accordingly, on receiving this letter, accompany Captain McNeill, and afford to him every aid within your power.

You will also consider your office and public correspondence, and you several assistants and their offices and records, submitted to the inspection of Captain McNeill, should his instructions, of the character of which I am not apprised, comprehend an examination of the cost of the work, and of the manner of executing the contracts for its construction and measurement.

I am, very respectfully,
Your obedient servant,
C. F. MERCER,
Pres. of the Ches. and Ohio Canal Co.

ALFRED CRUGER, Esq.
Resident Engineer of the 3d Residency of Ches. and Ohio Canal.

CANAL OFFICE, WASHINGTON, *June* 1, 1833.

SIR: Having been advised by Captain Wm. Gibbs McNeill, of the topographical corps of the army of the United States, that he has been instructed by the Secretary of the Treasury to make an inspection of the Chesapeake and Ohio Canal, and that he desires to be accompanied in the performance of this duty, by one or more of the agents of the company conversant with the work, on receiving this letter, you will, therefore, deem yourself instructed to attend Captain McNeill in the inspection which he contemplates, and to afford to him every aid within your power.

Should this inspection embrace an inquiry into the manner in which the works of your residency have been conducted, you will consider all the public records of your office open to his examination, and you will disclose to him the terms of our contracts, and the cost of every part of the work of your residency, as well as the mode of estimating and paying for the same.

I am, very respectfully, &c.

C. F. MERCER,

Pres. of the Ches. and Ohio Canal Co.

T. F. PURCELL, Esq.

Resident Engineer of the 4th Residency of Ches. and Ohio Canal.

Report of Captain Wm. G. McNeill on the condition of the Chesapeake and Ohio canal.

BOSTON, MASSACHUSETTS, *December* 1, 1833.

To Lieut. Col. J. J. ABERT,

Topographical Bureau, War Department, Washington City:

SIR: In compliance with the orders of the honorable Secretary of War, communicated to me through the Topographical Bureau, under date of May 16, 1833, as soon after as practicable, I repaired to Washington City, and having, as directed, reported myself to the Secretary of the Treasury, on the 1st of June I received from that officer his instructions to "proceed and make the necessary examination" of the Ohio and Chesapeake canal, which, from an enclosed transcript of the resolution passed by the Board of Directors of that company on the 4th of May, I was apprised included an extent of "sixty-four miles, which were expected to be completed and brought into active use in the course of the month;" as well as "thirty-eight miles in addition thereto," which were then also "under contract."

As a preliminary to this examination, I accordingly at once conferred with General Mercer, the presiding officer of the company, then in Washington, not only that I might become fully possessed of the nature and extent of the inspection contemplated by the resolution of the directors, but that in its execution I might avail myself of those facilities which were promptly afforded, in his instructions to the several resident engineers, to disclose fully all information which could be desired, either by a personal co-operation with me in the field, or by a full exposition of the archives of the company, to which my attention was specially invited.

Under these advantageous circumstances, I proceeded on the 4th of June to the fulfilment of the duty which had been assigned me, traversing the line of canal throughout the extent to which it had either been completed, or was in the progress of construction; the result of my observations during which tour I shall now have the honor to communicate. I would premise, however, that they correspond so nearly in all essential particulars with the numerous detailed statements which, from time to time, have been officially announced through the printed reports which have been submitted to the stockholders, that the main object in view will, perhaps, as well have been attained by my corroboration of those state-

ments, as by the repetition of facts which, on reference to those reports, will, for the most part, be found to have already been disclosed.

Nevertheless, the magnitude of this great work may permit an examination of details (at the hazard of being tedious) which will, perhaps, be found illustrative of its extent and character; while the importance of the enterprise in the widely diffused benefits which must attend its success to an extended portion of our country, encourages the hope, that even in pursuing the beaten track which laid before me, additional information may have been gathered by the way-side, the dissemination of which will, at least, prove useful.

I shall proceed, therefore, now to state the character and condition of such portion of the canal, with its various appendages, as had either been completed, or had been placed under contract; which, computing from the basin in Georgetown, (where my examinations began,) ascends the valley of the Potomac river upwards of 107 miles, or to the guard lock succeeding dam No. 5, above the town of Williamsport.

Of this portion every part of the work may be said to have been entirely completed to the "*Point of Rocks*," 48 miles from the basin at Georgetown, and, with very unimportant exceptions, (where the discovery of slight imperfections has already lead to their repair,) exhibited all that faithfulness of execution which ensures stability.

The reports of Colonels Abert and Kearney, who preceded me in a similar examination in 1831, so minutely described this section of the canal, that a very general summary will suffice to exhibit the facts which I would bring in review on this occasion.

In the words of the late President of the company, (see 3d annual report, page 13,) it may emphatically be remarked, that "on no canal in America, and very few, if any, in the world, will there be found, and certainly on no part of the Chesapeake and Ohio canal do there remain to be encountered, obstacles more appalling than have been overcome." True it is that he refers more especially to that particular section which embraces the descent between the Great and Little Falls of the Potomac; "a compass of eleven miles along precipices, bounding a river which has borne on its bosom ice and snow, elevated for several miles 30 feet above its ordinary height." Yet the numerous locks and culverts, the extent of rock excavation, and of outer walling which has been found necessary to the support and protection of the towpath, two expensive acqueducts, &c. &c., constitute difficulties characterizing the whole section under consideration, which, from description alone, can scarcely be appreciated. But they were encountered boldly and judiciously, and, in the successful issue which has attended the persevering efforts of those to whom this great work has been entrusted, it is to be hoped that encouragement may not be wanting to enable them to reap the full fruition which must attend the final completion of the enterprise.

To surmount the elevation of 217 feet, (the level of the canal at the Point of Rocks above the basin in Georgetown,) 27 locks, generally of 8 feet lift, have been constructed, the total cost of which has been, (as per statement furnished me by Mr. Fisk, an assistant engineer in the service of the company, to whom, as also to Messrs. Cruger and Purcell, the resident engineers, I am indebted for a mass of valuable facts) $265,142, being an average of $1,221 85 per foot lift, inclusive of the cost of foundations, and of gates, and, in part, the excavation of the lock pits, as well as in part the embankment around the locks.

These locks being nearly all of them, as before remarked, of 8 feet lift, the above average of $1,221 85, (deducting for excavation and embankment,) is equivalent to $1,136 per foot lift; or, as there are about 1,084 perches in a lock of 8 feet lift, it is equivalent to $7 per perch for the masonry, and $1,500 for the foundation and gates. The subjoined table (A) will exhibit the locality of the several locks, the lift of each, the description of materials of which they were constructed, and the locality whence these materials were procured, which, with all the details of their plan, as enumerated in the report of Colonels Abert and Kearney, have permitted such an analysis as enables me to say that, under all the circumstances, a due economy has, in my opinion, obtained, both as it respects the prices paid, and the character of the work. The general dimensions of the locks are 15 feet in width in the chambers, and 100 feet between the upper sides of the mitre sills, and with one exception, from No. 1 to No. 25, inclusive, they are filled through culverts in the side walls. (See report of Colonels A. and K., p. 97.) Locks Nos. 26 and 27 are filled through culverts in the side walls, and through a paddle in each of the upper gates; the upper being nearly of the same length as the lower gates. As the dimensions of the locks are uniform, and all information respecting their character and locality will have been furnished by table A,) it may here be added that, from lock No. 28, inclusive, upwards, the culverts in the side walls (which mode of construction is liable to some objections) are dispensed with, and four paddle valves in the upper gates, (which are one foot shorter than the lower gates,) 2 feet by 2½ feet each are substituted. (See specifications.) It is not apprehended, however, in the present case, that from either mode there will result insecurity to the works, or inconvenience in the operation of filling the locks. Of the character and condition of the culverts, if, in all instances, I am not able to bear as favorable testimony, it results from exceptions too unimportant to be worthy of any other comment than that they consisted in imperfections which were soon discovered, and easily remedied, and which, doubtless, ere this, have ceased to exist; and from the precautions which were taken (as stated in the reports of Colonels A. and K., p. 103) to secure their foundations, as well as from the ample dimensions of all parts of these useful and important appendages to the canal, there is ample assurance of their stability.

In all, including roadways, there are fifty-nine culverts below the Point of Rocks, the cost of which has been, (agreeably to the statements furnished me) $110,000, of which number the 32 culverts on the first 22 miles contiguous to and below the Point of Rocks, (which, being in general unfinished, were not so particularly attended to at the date of the last inspection,) have cost $59,000. Of this sum, the masonry, amounting to 11,357 perches, cost $50,000, or an average of $4 40 per perch; $9,000 being the cost of the foundations, of puddling the culverts in part, and for the excavation of the pits in part.

The dimensions of these 32 culverts are as follows:

1 of 2 feet span; 11 of 4 feet span; 9 of 6 feet span; 2 of 8 feet span; 1 of 9 feet span; 1 of 10 feet span; 3 of 12 feet span; 2 of 16 feet span; 1 of 2 arches of 16 feet span each; 1 of 20 feet span over the Little Monocacy.

The masonry of one of the above culverts, (that of two arches of 16 feet span each,) containing 1,100 perches, cost $5,807; the stone for which

were boated 8 miles, and hauled nearly half a mile; that of another of 20 feet span, over the Little Monocacy, with an oblique arch, $5,354; the number of perches in it being 1,241, and the stone obtained within half a mile. The culvert over the Tuscarora, 2 miles above the Monocacy aqueduct, of 16 feet span, containing 919 perches, cost, for the masonry, $3,676, the stone being brought from Virginia within 1½ miles. The other culvert with an arch of 16 feet span, one mile below the Point of Rocks, (where the materials for its construction were obtained) cost, for its 764 perches of masonry, $2,528 50. The stone for all the others, 22 in number, (deducting 6, the materials of which were transported about half a mile,) was obtained by water from distances varying from 2 to 8 miles; this difference in transportation causing the price of masonry (which averages, as above stated, $4 40 per perch) to range between $3 50 and $5 50 per perch.

The hydraulic cement used in the construction of all the culverts cost the contractor at the rate of one dollar per perch.

The remaining culverts of the 59, mentioned as being the total number below the Point of Rocks, and situated on the first 26 miles of the canal, from Georgetown upwards, are spoken of generally in the report of Colonels A. and K.: they are 27 in number, and cost $51,000; the average price per perch being rather less than those above, on account of the greater facility of obtaining stone.

Next, in the enumeration of the items of expense which have contributed materially to enhance the cost of the section of canal under consideration, are the Seneca and Monocacy aqueducts, the details of the plains to which will be found in the report before alluded to, (pages 99, 101,) although, at that time, comparatively little progress had been made in their construction. They have since been entirely completed, and now constitute enduring monuments of the skill and fidelity with which they have been executed.

Aqueduct No. 1, across the Seneca river, built of the red sand stone of Seneca, (procured within half a mile of its site,) is 114 feet in length between its abutments, which, with its two piers, rest on a solid rock foundation. It consists of 3 arches of 33 feet span each, and cost $22,784.

Aqueduct No. 2, over the Monocacy river, built of a white granite stone, of excellent quality, obtained from quarries within 3 miles of the site, is 438 feet in length between the abutments, and 516 feet from end to end of the wing walls, which project from them. There are 7 arches of 54 feet span each, and 9 feet rise, (segments of a circle,) the radius of the intradors of which is 45 feet.

It has in fact been constructed in the manner proposed, as described in the report of Colonels A. and K., and containing 9,788 perches of masonry, (exclusive of the rough walls in which the cut masonry of the wings terminates,) has cost the sum of $125,000.

There are in this aqueduct 25,500 superficial feet of cut ashlar: 11,000 superficial feet of coping: 10,500 superficial feet of sheeting, measuring the intradors only, and rather more than 1,000 lineal feet of water table: in all constituting a work which, while it is highly ornamental, unites, (in the words of Colonel A. and K.) both in its plan and execution, "the true principles of economy, usefulness, and durability."

Controlled as the engineer necessarily was, in his location of the canal, by the rocky and precipitous cliffs which, to a great extent, are washed

by the Potomac, while an unusual quantity of rock excavation, on the one hand, was unavoidable, on the other he has judiciously disposed of his materials in the construction of permanent walls for the protection of the canal against the otherwise resistless action of the river; and, for more than one-quarter of the whole distance, an inner paving of stone effectually secures the towpath from abrasion. Comparatively few repairs, therefore, will be requisite, and the enhanced cost attributable to the more than ordinarily stable character of every part of the work, will eventually result in a saving to the stockholders, which will have proved such expenditures, in the first instance, to have been judicious. Indeed, as suitable materials abound, it is, I think, to be recommended that, as an economical means of their transportation shall be afforded in the use of the canal, timely provision should be made (by deposites of these materials at convenient intervals) for the eventual paving of the towpath throughout its extent, the cost of which, so far, per superficial yard, one foot thick, (when the stone were within 120 feet,) has been but 12½ cents.

The total quantity of excavation, embankment, &c., with the cost of the same, in their several varieties, in order to form the trunk of the canal from the Rock creek basin, at Georgetown, to the Point of Rocks, has been as follows, to wit:

		Average per yd.	Common av.
Grubbing, - - - -	12,892		
1,893,666 cubic yds. common excavation,	190,917 cts.	$10\frac{8}{100}$	$12\frac{62}{100}$
439,071 do hard pan,	103,412	$23\frac{55}{100}$	
75,472 do quarry rock,	23,761	$31\frac{48}{100}$	$67\frac{46}{100}$
398,524 do rock blasted,	295,996	$74\frac{27}{100}$	
571,121 do embank. from canal,	75,284	-	$13\frac{18}{100}$
962,729 do do *not* fr. canal,	185,749	-	$19\frac{29}{100}$
97,092 do puddling,	25,107	-	$25\frac{86}{100}$
215,701 perches of walling, from stone, paid for as excavation	116,407	- perch	$53\frac{97}{100}$
15,363 perches of walling, from stone, not paid for as excavation	15,528	-	$1 $01\frac{7}{100}$
Extras - - -	40,800		
Total - -	$1,085,853		

Postponing for the present the further remarks which may be applicable to the portion of canal which, at the date of our inspection, had already been completed, and to which our attention has thus far mainly been confined, I shall next proceed to similar statements of the condition of the work above the Point of Rocks. This, which, as has been stated, extends to a distance of 107 miles from Georgetown, had already so far progressed, that the expectation might be confidently entertained that, by the opening of the coming spring, it will also have been entirely completed. Indeed, the interval between the Point of Rocks and the head of Harper's Ferry Falls, (to the completion of which mustbepostponed the use of that already finished above the introduction of the Seneca feeder, and which, as will be shown, depends for its supply of water on the Potomac, above the Harper's Ferry Falls,) a distance of about 14 miles, it was supposed, would, at all events, be finished (as it is believed it has been) by the first of September past, and that, during the current year, the use of the canal would be secured as far as Shepherdstown, 72½ miles from the basin at Georgetown.

These expectations were thought by me to be well founded, and in accordance with the statements furnished me of the work done, compared with that remaining to be done, confirmed by my own observations at the time alluded to. The formation of the canal, including the excavation, embankment, and necessary walling, was, on the 1st of May, more than half completed. The seven locks between the Point of Rocks and Harper's Ferry falls were so nearly finished at the time of inspection, that it was estimated that the sum of but $2,000 would suffice to complete them; and, of the remaining ten locks then in progress, about one-third of the work had already been completed.

A comparative view, however, is exhibited of the progress which had been made in the formation of the canal above the Point of Rocks, in the following statement of work *done*, contrasted with that *remaining to be done*.

Work done.

Grubbing - - - -	$7,151	19		cents.
1,516,016 cubic yards excavation of earth,	182,614	49,	av. p. yd.	12 5/100
253,944 do do rock,	168,348	70,		66 29/100
262,189 do embank. from canal,	28,567	60,		10 90/100
394,228 do do *not* from canal,	92,727	56,		23 52/100
10,167 do puddling - -	1,776	00,		17 47/100
103,139 perches of walling, from stone out of the excavation - -	46,950	99,	perch	45 52/100
3,482 perches of walling, from stone, not paid for as excavation -	3,208	00,		92 13/100
Extras - - - -	2,428	13		
	$533,772	66		

Work to be done.

Grubbing - - - -	$2,501	81		
1,157,889 cubic yards excavation of earth,	133,532	27,	av. p. yd.	11 53/100
179,758 do do rock,	110,897	95,		61 69/100
8,150 do do slate,	1,841	00,		22 59/100
184,569 do embank. from canal,	20,530	63,		11 12/100
509,163 do do *not* from do	103,733	78,		20 37/100
27,450 do puddling - -	3,390	75,		12 35/100
68,168 perches of walling, of stone out of excavation - -	32,822	02,	perch	48 15/100
6,240 perches of walling, of stone, *not* out of excavation -	5,794	00,		92 85/100
Extras - - - - -	6,136	00,		
	$421,180	21		

Note.—All earth paid for as excavation, and *hauled more than* 120 *feet* is considered as embankment from canal, in contradistinction to that obtained from the outside of canal; and, in like manner, there is a division of the wall into walling from stone which comes out of the excavation of the canal, and that which does not.

As it has been stated, below the Point of Rocks, that massive walls were often unavoidable for the support and protection of the canal, so above the Point, do the numerous cliffs which impinge upon the stream frequently necessitate a location fruitful in like sources of expense. And as some diversity of opinion seems at one time to have prevailed respecting the *particular* location around the Point of Rocks, or between that spot and Harper's Ferry, my attention was naturally directed to the subject, and it has resulted in the opinion, that whether a canal or railroad had been the object *singly*, the engineer, in consulting the interests of either, could scarce have found a reason for preferring a greater exposure of the work, than that which was irremediable, if he would avoid (as he has done in the location of the canal) an undue quantity of rock excavation. Of the extent to which the canal, under the advantages acquired by priority of construction, is notwithstanding washed by the river, or in the occupancy, often, of a portion of its bed, it will suffice to state, that walling has been necessary to its protection, for about ten miles of the distance now under contract, above the Point of Rocks. On this portion, we find also, that the paving of the inner slope of the towing path has continued to be judiciously persevered in, wherever a surplus of rock excavation would afford the materials, as was found to be the case for seven miles and nine-tenths, or more than half the entire distance between the Point of Rocks and Harper's Ferry Falls. From this last named locality upwards, we have not the means of estimating, with precision, the extent to which the inner paving will be continued, as it is the last operation incident to the completion of the canal.

The construction of the culverts above the Point of Rocks, so far as they had advanced, was in general satisfactory, and in their general plan and character, they correspond with the details given, respecting these constructions, in the report of Colonels Abert and Kearney, with the exception, that the length of those, below Harper's Ferry, are generally 110 feet, while those above (consequent to the diminished width of the canal) are usually but 100 feet in length. Their other dimensions, of course, vary with the span of the arch; and the following statement will include such further information as may be desired respecting them.

Between the Point of Rocks and the head of Harper's Ferry falls there are nineteen culverts, which, at the date of the inspection, had already been completed, the dimensions and cost of which are as follows:

	Span of arch in feet.	Number of perches.	Price per perch.	Cost of masonry.	Cost of foundations.	Cost of extra excavation.	Total cost.
Between the Point of Rocks and Berlin, a distance of seven miles.	8	318	$4 00	$1,272	$76	$456	$1,804
	4	182	4 00	728	201	143	1,072
	12	298	4 50	1,341	106	827	2,274
	10	487	4 50	2,192	104	682	2,978
	4	132	4 50	594	38	427	1,059
	16	795	4 12	3,273	106	332	*3,711
	4	183	4 50	824	36	184	1,044
	10	504	4 00	2,016	104	257	2,377
	4	174	4 00	696	36	389	1,121
	6	311	4 25	1,322	315	101	1,738
	8	367	4 50	1,652	82	332	†2,066
Between Berlin and the head of Harper's Ferry Falls, a distance of seven and one-third miles.	8	360	4 00	1,440	59	190	1,689
	8	334	4 50	1,503	60	199	1,762
	6	300	4 00	1,201	53	508	1,762
	12	589	4 00	2,355	92	790	3,237
	6	283	4 00	1,132	38	601	1,771
	6	280	4 50	1,260	260	800	2,320
	20	751	4 00	3,004	–	506	‡3,510
	6	191	4 00	764	–	669	1,433
	158	6,839	–	28,569	1,766	8,393	38,728

*Over the Little Catoctin.
†In Berlin.
‡Over Israel's creek.

The average price, therefore, of this masonry, per perch of 25 cubic feet, has been $4 18, that of the foundations $92 95 each, that of the culvert pits and extras $441 74 each.

Above the head of Harper's Ferry Falls there were, at the date of the inspection, in the progress of construction, (about one-half of the work being then done,) 41 culverts, the estimated cost of which is $44,300, the contract price for the masonry being $4 per perch.

At the Point of Rocks, there was under construction, and nearly finished, one of those pivot bridges, which, wherever bridges have been thought necessary from the intersection of the canal with a public road, have been substituted for the permanent bridges, which constitute such a source of annoyance on canals generally. The under part of the bridge is 11 feet above the water's surface, the pivot of which rests on a square pier 15 feet in thickness, leaving a breadth of canal 22½ feet on either side of it. Permanent bridges having been entirely dispensed with above Georgetown, (unless the high wooden bridge opposite the Little Falls, see report of Cols. A. and K., page 93, be an exception,) there are of course several of these pivot bridges, (five between Georgetown and Shepherdstown,) but it has been more usual to effect the passage of the canal, by means of road-ways through culverts, under the canal, or, where the thoroughfare was less public, by means of ferries. There will be no obstruction, therefore, to the safe and comfortable transportation of passengers on this canal, with such

celerity as, amid all the improvements of the age, it shall be found practicable and expedient to attain.*

Having passed the Point of Rocks and the works which succeed it, consisting of walling for the support of the Baltimore and Ohio railroad, (which, for several miles between the Point and the temporary termination of the railroad at Harper's Ferry, is immediately in contact with the canal,) locks Nos. 28 and 29, culverts, &c., at the distance of 53 miles from the Point, the canal crosses the Catoctin, a tributary to the Potomac, on a stone aqueduct, the whole of which, with the exception of the coping, had already been completed. This aqueduct, No. 3, includes three arches, two of which are semi-circular, of twenty feet span; the third being a semi-ellipsis, of forty feet span and ten feet rise, supported on piers, the height of which is about eight feet above low water. The dimensions of this portion of the piers are six feet in width by thirty-three feet in length, while those of the portion under water (six or seven feet in depth) are eight feet wide by thirty-five feet long. The piers are founded on solid rock. The beds and joints of the face stone above the tops of the piers are cut, their face being left rough, or what is called *rock work*. These stone were obtained from the granite quarries of the Patapsco, and transported forty-six miles on the Baltimore and Ohio railroad to the Point of Rocks, whence they were wagoned three miles to the aqueduct. The masonry below the tops of the piers is of ranged rubble work, the stone for which were boated down the Potomac seven miles, from a quarry near lock 31.

Besides the rough wings, (which cost $2,000,) there are 2,800 perches of masonry laid in water cement. The bottom of the trunk is planked the same as the Monocacy aqueduct. Pilasters at the head of the piers are dispensed with. There is a water table projecting six inches, and the coping, one foot in thickness, projects ten inches. The thickness of the towpath parapet is seven feet, that of the berm parapet five feet, and the width of the water way twenty one feet.

The total cost of this aqueduct (exclusive of the iron railing with which it is intended to surmount the towing path) is stated to have been $33,500.

Aqueduct No. 4, over the Antietam, which enters the Potomac eight

* On the subject of comparative resistance, and consequent cost of transportation at different velocities, with the effect upon the canal from the abrasion of its banks, some curious facts are stated by a Mr. Thomas Grahame, as the results of actual experiment on the Ardrossan or Paisley canal, which will be found in an address made by him "*To the canal proprietors,*" in Great Britain, in 1832. He states that the *ordinary speed* for the conveyance of passengers on the Ardrossan canal, (the narrowest, shallowest, and most curved canal in Scotland,) has, for nearly 2 years, been from *nine to ten miles per hour*, and that "at this rapid speed the banks of the canal have sustained no injury." This he in part ascribes to the shape of the boat, the construction of which he proceeds to describe, and to the discovery that the resistance to the boat, at *high* velocities, is not in the ratio we are accustomed to assign to it. However this may be at variance with ordinarily received opinions, it will surely become those interested to test the truth or fallacy of statements which have been so gravely advanced, by prosecuting their inquiries on the subject, and by instituting experiments, the success of which will so much enhance the value of their enterprise. Indeed, while it becomes us to abstain from speculations which may not be realized, the seriousness with which it is rumored that principles have been introduced in the construction of steamboats now being built at Troy, New York, which are calculated to ply at a speed heretofore deemed almost impracticable, would lead to the inquiry if similar principles may not result in the use of steamboats on canals. Be the improvements what they may, however, the dimensions of the Ohio and Chesapeake canal will all the better adapt it to their use; for, however incredulous may be received the opinions we have quoted, we experience no difficulty in subscribing to the belief of the same authority, that far greater results would have obtained on the Paisley canal had its dimensions been enlarged.

miles beyond the Government dam above Harper's Ferry, is 108 feet long between the abutments, which are nine feet thick, and includes three semi-elliptical arches, two of which are twenty-eight feet span, and the third of forty feet span, with a rise each of ten feet. The foundations of the piers and abutments are on rock; the former averaging seven feet in height, two and three quarters feet of which, called the foundation, is built of rubble work. The remainder of the pier is of cut stone, around the top of which, at the springing of the arch, (twelve feet below the bottom of canal,) there is a belt eight inches in thickness, levelled to six inches, and projecting six inches. There will be a water table projecting nine inches, the thickness of which will be also nine inches, levelled off to six inches, and the coping, ten inches thick, will project nine inches.

Pilasters, four feet in width, commence at the springing line of the arch, and project twenty-one inches at bottom and fifteen inches at top.

Towing path parapet 7 feet thick at bottom, 6 feet at top.

Berm	do	5	do	do	4	do
Width of track		20	do	do	22	do
		32			32	

The ring stones (thirty nine at each end of the large arch, and thirty-one at the ends of the smaller arches) are two and a half feet in depth at the spring, and two feet at the course. The wings are forty-six feet long, and seven and a half feet thick. The beds and joints of all the face work are cut, the face itself being rough, except the facing of the sheeting, of the pilasters, of the coping, and the water table, the ends of the piers and abutments, which are smooth cut.

This aqueduct is built of limestone, procured within three-quarters of a mile, and the contract price for the masonry, including coffer dams, excavation, &c.; in fine, every thing, (excepting the dressing of the face of the ring stones, belt, and pilasters, which was not contemplated when the contract was made,) is $7 per perch. It will contain 3,050 perches, of which about three-fourths had been built on the first of June, and the total cost of the whole structure will be $22,850.

Aqueduct No. 5, by which the canal is to be passed over the Conococheague, which enters the Potomac at Williamsport, about one hundred miles from Georgetown, will, from the excellent quality of the material, and the care and skilfulness with which it was being built, be an admirable structure, and in keeping with the best specimens elsewhere met with on this canal. Its abutments and piers (the dimensions of which, as well as other parts of the work, will be found minutely detailed in the accompanying specification furnished me by Mr. Purcell, the resident engineer above Shepherdstown,) are founded on the solid rock which, fortunately, forms the bed of the creek; and from these, spring the three arches of sixty feet span each, the versed sine of which is fifteen feet. The masonry, of which the aqueduct will include 4,900 perches, is of the character denominated "rock work," excepting the pilasters, ring stones, sheeting, water table and inside of the parapets, which will be of cut stone, (the whole of which will be laid in cement mortar, or grouted, or both, as may be directed by the engineer,) will cost $8 per perch. It will be built of a compact blue lime stone, of excellent quality, transported from almost exhaustless quarries within three miles of the site, and may doubtless be en-

tirely completed by the coming spring. Its total cost, it is estimated, will be $40,260.

Having now, as succinctly as we could, described the several aqueducts, let us next attempt an analysis of the cost of the lift locks above the Point of Rocks. The total cost of the seven which lie between the Point and the feeder, at the head of Harper's Ferry Falls, and which, as has been stated, were almost completed in June, will have been $56,643 for the masonry, $7,370 for the foundations, $3,850 for the gates, and $10,404 for the excavation of pits, and for the embankments around the locks, (the uniform practice, above the Point of Rocks having been to estimate the excavation and embankment with the lock;) these several items make an average of $1,280 43 per foot lift for the masonry, gates, and foundations; and, as there are 7,649 perches of masonry in the seven locks, it is equivalent to $7 40 per perch of masonry, to $1,052 89 for each foundation, and to $550 for the gates of each lock.*

From the foregoing statements, then, it appears that the twenty-seven lift locks below the Point of Rocks, of 217 feet of total lift, built entirely of cut stone, have averaged, including foundations and gates, $1,136 per foot lift; the seven next above the Point of Rocks, (53 feet total lift,) similarly built, $1,280 per foot lift; the eight above the head of Harper's Ferry Falls, (64 feet total lift,) built as before, will average $1,120; and the remaining two, (19 feet total lift,) built of hammered stone, will average $800 per foot lift.

The greater cost of the masonry between the Point of Rocks and Harper's Ferry, than elsewhere, is to be attributed to the difficulty with which suitable stone were obtained; as an evidence of which, the contractor for lock No. 30 found it cheaper to go 32½ miles to Seneca, for his cut stone, than to work any of the quarries nearer; and although the prices for the unfinished work would seem to be a little less than the actual average cost below Harper's Ferry, they are thought to be fully as adequate, considering the greater facility and less cost of obtaining cut stone; that cement will cost less, and that the healthiness of the country is better: this latter cause, especially being one which, as the work advances towards the mountains, may be expected hereafter to operate advantageously to the interests of the company.

*In a lock of eight feet lift, as these in general are, there are in the foundations 2,506 feet lineal of timber 10 by 12 inches; and in the two courses of planking, and in the sheet piling, 17,900 superficial feet (board measure) of two and three inch plank; the price of which at Harper's Ferry, where the plank for these seven locks was mostly obtained, has been, for more than a year past, from $17 50 to $20 per thousand feet, at the saw mill.

There are also in these locks, of eight feet lift, about 1,084 perches of masonry in each; 4,426 superficial feet of ashlar, (excluding coping and hollow quoins,) 436 lineal feet of coping, one foot thick by three feet wide, making four feet of cut work for every foot lineal, and 61⅔ feet rise of hollow quoins; and where the cut stone are exactly of the size required by the specifications, there are 384 perches of the cut stone and 700 perches of backing. The quantity of cement used in the construction of each lock of eight feet lift has varied from 3,000 to 3,300 bushels. That used below Seneca was furnished to the contractor at 40 cents per bushel; from Seneca to the head of Harper's Ferry Falls, its cost has varied from 30 to 40 cents per bushel; and, generally, above Harper's Ferry Falls, (as it has much more conveniently been obtained,) its cost has been, exclusive of transportation, but about 21 cents per bushel of 70 pounds.

Two of the lift locks above the head of Harper's Ferry Falls, Nos. 41 and 42, of (10 and 9) 19 feet lift, are to be built of hammer dressed lime stone for $800 per foot lift, including gates and foundation; and all the remainder, eight in number, and of 64 feet total lift, are to be of cut stone, at an average price, per contract, of $1,120 per foot lift.

Besides these 44 lift locks, which have been enumerated, by which the canal overcomes a fall of 353 feet, a communication with the river is to be effected through the guard locks at the entrances of the feeders from the Potomac, and also through the several lift locks designed for the accommodation of the Virginia trade.

One of the latter is directly opposite the junction of the Shenandoah river with the Potomac at Harper's Ferry, 637 yards above lock No. 32. It had been already finished, and is built of rubble masonry, from materials obtained in the vicinity, and in all its dimensions (except the lift, which is ten feet) it is similar to the locks of the canal.

The plan of the canal contemplates, at some future day, a dam across the Potomac, in this vicinity, for the purpose of a feeder, and (which is more important) to form a basin of still water, around the point of land on which the town of Harper's Ferry stands. In this event, the lift of the Shenandoah lock would be reduced to eight feet, and the water would enter the canal at the foot of lock No. 32.

Four similar locks are required, to fulfil the conditions of the subscription to the stock of the Canal Company by the State of Virginia, last winter. One opposite the mouth of Goose creek, which enters the Potomac opposite the foot of lock No. 25; another at the Point of Rocks; another opposite Shepherdstown, which had been placed under contract; (see fifth annual report, page 107;) and a fourth near the mouth of Opequon. The purposes of this last will, however, have been subserved, and it will, in consequence, be dispensed with, by the transfer, which had been determined on, of locks Nos. 41 and 42, "which were about to be commenced two miles above, to a point two miles below the mouth of the Opequon." "By this transfer," (the report continues,) "and the construction of a towpath along the three miles of steep rocky cliffs immediately above and below Galloway's mills, (by which the slack water navigation between guard lock No. 3 and lock No. 41 is reduced to three instead of seven miles,) about $100,000 will be added to the cost of the first 109 miles of improved navigation; which will, now, include about 104½ miles of independent canal, or nearly 106 miles, allowing for the extension of the canal 1 mile 373 yards from Rock creek into Washington."

This extent is supplied by five principal feeders from the Potomac, to wit:

1st. The Little Falls feeder, feeding four and two-thirds miles of canal, for the greater part of which distance the canal has eighty feet water surface, and seven feet depth; which dimensions, however, are immediately above the entrance of this feeder, diminished to sixty feet by six feet.

2. The Seneca feeder, supplying seventeen miles, although, about midway (at the foot of lock No. 18, at the Great Falls,) an additional supply is received from the Potomac, through a small arch under the towing path.

3d. The next forty miles of canal depends almost entirely on the supply which it receives from the Potomac at the head of Harper's Ferry Falls, the only other contribution being from a small feeder from the Tuscarora, which enters the canal seventeen miles below the head of Harper's Ferry Falls.

4th. A feeder from the Potomac at dam No. 4, feeding twenty-three and a half miles of canal.

5th. A feeder from the Potomac at dam No. 5, eight miles above Williamsport, feeding twenty miles of canal.

The admission of the waters of the Little Falls feeder into the canal, near lock No. 5, is regulated by a single guard gate; and that of the Seneca feeder, by a guard lock; for a description of which, as well as of of the two *stone dams* connected with these feeders, reference may be had to the report of Colonels A. and K., at which date, the canal, with its appendages, was finished, and in use, as far as the Seneca feeder.

The three next feeders from the Potomac river enter the canal through guard locks No. 2, No. 3, and No. 4, situated, respectively, No. 2, near lock No. 35; No. 3, 1 mile 320 yards above dam No. 4; No. 4, at dam No. 5. They are built of rubble masonry, (at an average cost of about $5 per perch,) of limestone; the first being nearly completed at the date of the inspection, and the two last at that time but recently begun.

Dam No. 3, being the next above that of Seneca, described, as before remarked, in the report of Colonels Abert and Kearney, is the *Government* dam, for the use of the works connected with the United States armory at Harper's Ferry, which has been availed of, for the purpose of the canal, at the head of Harper's Ferry falls. The quantity of water, however, which is in consequence, now drawn from the Potomac for supplying the canal, is no greater than formerly passed through the long canal, (a sluice around the dam on the Maryland shore, which was kept open until the construction of the present canal required it to be closed;) and the Canal Company is thereby enabled to avoid an expense to which it would otherwise have been subjected.

Dams Nos. 4, and 5, by which, the supply from the Potomac will be directed into the canal, through guard locks 4 and 5, are, in general, similar in their plan, (the details of which will be seen in the specification hereto appended, document C,) which was adopted, by the directors, after a full investigation of the subject by Mr. Purcell, the engineer, on whose residency these dams are building.

The results of his extended examinations, which led to the adoption of this plan, are contained in a report with which I was furnished, and which I have read with interest, and justifies the conclusion that they will prove durable, and, in all respects, answer the purposes for which they are intended.

They are to be built of wood, firmly secured to the rock on which they are founded throughout their lengths, and resting at either end against the solid rock, which in one case forms an abutment; or, where this is not the case, against abutments of rubble masonry laid throughout in hydraulic cement: ample wings extend from these abutments, which, in all, include about 3,000 perches. Their lengths are, respectively, 810 and 706 feet; height 20 feet; base 60 feet; and their conjoint cost, as exhibited in the returns of May 1st, (at which time one-fourth of dam No. 4 had been built, and dam No. 5 had been begun,) is stated at about $80,000.

The foregoing statements will have now furnished, it is hoped, with sufficient minuteness, such details as we have been enabled to collect, (as well from observation as from a careful examination of the archives of the company,) illustrative of the cost, character and condition of the work. Such, however, as relate to the formation of the canal, are recapitulated in the following *summary*, exhibiting the total amount of excavation, and embankment *done* and *to be done* (at the date of the inspection) on the whole canal

completed and under contract above its entrance into the Rock creek basin, (exclusive of the additional quantities and cost resulting from the transfer of locks Nos. 41 and 42, as previously stated, four miles down the river,) to wit.

Grubbing - - - -		$22,545 00			
5,006,642 cub. yds. of earth -		610,475 76,	av.	per yd.	12 12/100
907,698 do rock -		599,003 65,		do	65 99/100
8,150 do slate -		1,841 00,		do	22 59/100
1,017,879 do emb'kt from canal		124,382 23,		do	12 22/100
1,866,120 do em. not from canal		382,210 34,		do	20 48/100
134,709 do puddling -		30,273 75,			
387,008 per. of wall'g of stone p'd for as ex.		196,180 01,		do per.	50 69/100
25,085 perc's of wall'g *not* p'd for as exca.		24,530 00,		do	97 79/100
Extras - - - -		49,364 13			
		$2,040,805 87			

Of the above amount, the value of the work done of the above description, on the 1st May, was $1,619,625 65; and of that then remaining to be done, $421,180 22; (or, allowing for the transfer of locks 41 and 42, say $521,180;) and the average price of the whole work, "*done and to be done,*" will be as follows, to wit.

Cut stone, stone locks, including foundations and gates, per foot lift, - - - - -	$1,156 00	
Excavation of earth, per yard, - - -		12 19/100 *cts.*
Do rock, do - - -		65 99/100
Do slate, do - - -		22 59/100
Embankment from canal, per cubic yard, - -		12 22/100
Do not do do - - -		20 48/100
Walling, of stone, paid for as excavation, per perch, -		50 69/100
Do not paid as above, - - -		97 79/100

A review of all the circumstances justifies, in my opinion, the conclusion that, considering the nature and character of the work, prosecuted, as it has frequently been, amid all the disadvantages of sickness, of locality, and consequent interruptions, during the most important season of the year, the above prices can seldom have yielded more than the fair equivalent which is due to the enterprise and industry of the contractor.

As it respects the cross section, or dimensions of the canal, its general width, below the abutement of Harper's Ferry bridge, is sixty feet at the surface, with a depth of six feet, while above the abutment (the depth remaining the same) the breadth is diminished to fifty feet.

In both cases, however, there are exceptions to these general dimensions, as, for instance, between Georgetown and Little Falls, a distance of five miles, the canal has in general a width of eighty feet, with a depth of seven feet.

These enlarged dimensions, it would appear from the several annual reports of the directors, were adopted in compliance with "the well known object of the express condition attached to the United States subscription of a million of dollars, added to the desire, on the part of the Board, sanctioned by the voice of the stockholders, of promoting the application of water power to domestic manufactures, at the very advan-

tageous sites afforded immediately above, as well as near the termination of the canal."

In other situations, as between the Point of Rocks and Harper's Ferry, we find that, in a distance of twelve miles, the width of canal varies, for three and one-fifth miles, from seventy to eighty, and even one hundred feet; that is, there are of canal 1,520 yards, seventy feet wide; 1,760 yards, seventy-five feet wide; 1,120 yards, eighty feet wide; and 1,240 yards, seventy to one hundred feet wide. But it is to be remarked, that the advantages of these increased widths were here attained without additional cost, and indeed, from the nature of the ground, at less expense than if the regular width of sixty feet, adopted for this portion of canal, had been adhered to.

For like reasons, that is, because of greater economy of construction, above Harper's Ferry, in a distance of forty miles, it has been found expedient to deviate from the regular width of fifty feet, for five and a half miles; or, for

One mile	327	yards,	the canal averages	60	feet in width.
One mile	1,228	do.	do.	70	do.
	1,296	do.	do.	80	do.
	180	do.	varies from 60 to	120	do.
	1,605	do.	do. 60 to	150	do.
	810	do.	do. 60 to	200	do.
	810	do.	do. 80 to	150	do.

Five miles and 976 yards $=5\frac{55}{100}$.

In contemplation of these dimensions, or rather of those more generally adopted for the cross section of this canal, we are led to remark that (however expedient it may have been to reduce the width above Harper's Ferry, in order that, by husbanding their resources, the company might with greater certainty reap the expected fruits of their enterprise, when the canal should reach the vicinity of the exhaustless coal mines of the Alleghany mountain,) a consideration of the superior advantages of the more enlarged dimensions, at least justifies, in my opinion, the expectation that a full equivalent for the increased cost attendant on them will hereafter have been realized. They have obtained, it will be recollected, on a portion of the canal, which will not only concentrate almost the whole trade to be derived from successive contributions, in its progress from Cumberland, if not from Pittsburg, towards Georgetown, but on a portion to which will be confined the important accession to the general trade of the canal, in the transportation of the varied products of the fertile and extended valley of the Shenandoah.

An additional motive may also be found to compensate for increased cost of construction, in the greater effect of the moving power, (see calculations on this subject, based on the experiments of D'Alembert, Condorcet, Bossut, and Dubuat, in the report of the United States Board of Internal Improvement made in 1826,) and the consequent reduction in the expense of transportation, which, when it is recollected that this portion of the canal must compete with the Baltimore and Ohio railroad, is not the less calculated to make the canal productive.

Similar reasons do not, to the same extent, obtain, in recommendation of

like dimensions, beyond Harper's Ferry; and it is, therefore, in harmony with the principles which govern both the plan and execution of this work, that, above this point, we find its greatest width diminished. I would respectfully submit, however, the opinion which I entertain, that, in the further prosecution of this canal, considerations of cost of construction would have an undue influence, and the utility of the work be impaired, if (at least) the dimensions adopted (although not preferred) by the United States Board of Internal Improvements be not preserved. Peculiar difficulties, resulting from the precipitous cliffs, on the one hand, and the depth of water at their base, on the other, would, however, at particular locations, justify exceptions to any general rule; but, from the knowledge which I have had the opportunity to acquire of the ground to be occupied by this canal throughout its contemplated extent, its minimum width should scarcely, I think, in any case, be less than 40 feet; the increased resistance resulting from which, compared with that on a width of but 48 feet, as shown in the report above alluded to, in which this subject was so fully discussed, is in the ratio of 1.58 to 1.21, or as 130 to 100.

An allusion to peculiar difficulties, encountered by the canal at particular localities, elicits a few remarks in relation to the *Baltimore and Ohio Railroad*, which, perhaps, may not be entirely irrelevant to this occasion; for, although a conflict between these two great works has, until recently, been carried on almost from their incipiency, it is at length happily terminated; and it is believed that their interests may be made to harmonize, and the prosecution of both be mutually beneficial. The mineral products of the Alleghany, at the sources of the Potomac, may find an *additional* market for their consumption, through the avenue to be afforded by the Baltimore and Ohio railroad, from the Point of Rocks to Baltimore; while many of the agricultural products of the soil, diverted from the ordinary channels through which they are now directed, (by such facilities as a railroad would afford,) may be made tributary to the trade of the Potomac. At any rate, from the prior occupancy of the ground, by the canal, which else had been pursued by the railroad, the conviction has arisen that the construction of the one will have rendered, almost impracticable, the extension of the other, by the route originally contemplated, and I am led, therefore, to suggest the alternative offered, in the facility with which the railroad may be extended *through the valley of the Shenandoah*, in a consideration of the advantages of which, may, perhaps, be found, an adequate inducement. (See reports of Col. Long, Dr. William Howard, and Captain McNeill, on the reconnoissance and surveys made in reference to the Baltimore and Ohio railroad, 1828.)

To return from this digression, I would, in conclusion, remark that I have received facilities in the execution of the duty assigned me, which claim my acknowledgments to General Mercer, the president of the company at the date of the inspection, to Messrs. Cruger and Purcell, the two resident engineers, and to Mr. Fisk, an assistant engineer in the service of the company, who accompanied me throughout the examination. A disposition was manifested, by all, to invite the strictest scrutiny, not only of the manner in which the work had been executed, but also of its cost; and I may not withhold my willing testimony to the highly creditable arrangement of the archives of the company, which, from examination, whether at their office in Washington, or the two residences, at Harper's

Ferry and Williamsport, is such, as to admit of the most ready reference, and to provide for the most satisfactory accountability for the varied disbursements of the company.

Which is respectfully submitted by, sir,

Your obedient servant,

WM. GIBBS McNEILL,

Capt. Top. Eng'rs.

	Location.				Lift, in feet.	Total lockage.	Description of work.	Stone used for the face work, where obtained, &c.
	Distance from lock to lock.		Distance from tide lock at the mouth of Rock creek.					
	Miles.	Yds.	Miles.	Yds.				
Tide lock at the mouth of Rock creek, -	–	–	–	–	–	–	Cut work - - -	Aquia creek free stone.
Lift lock No. 1	–	661	–	661	8	8	Do - - -	
2	–	81.5	–	742.5	8	16	Do - - -	
3	–	100.5	–	843	8	24	Do - - -	
4	–	98	–	941	8	32	Do - - -	
5	4	909	5	90	8	40	The lower six feet of these two locks are of stone, hammer-dressed, the remainder cut work.	The *hammer dressed stone* is from a quarry less than a mile distant. The *cut stone* is from Aquia creek.
6	–	637	5	727	8	48		
7	1	1075	7	42	8	56	Cut work - - -	Granite, except the coping, which is of Aquia creek free stone. The granite is obtained from a quarry within an eighth of a mile.
8	1	594	8	636	8	64	Do - - -	Red sand stone, boated down from the quarries at Seneca, 14½ miles.
9	–	604	8	1240	8	72	Do - - -	Built of granite, except the coping, which is of Aquia creek free stone, and a few feet of ashlar, which are of red sand stone, from Seneca. The granite is from the quarry near lock No. 7; distance of transportation 1.75 miles by land.
10	–	153	8	1393	8	80	Do - - -	Entirely of granite. One-half from the quarry near the lock No. 7, the other half from a quarry four miles in the country. The transportation comes by land.

11	–	319	8	1712	8	88	Do	-	-	-	Red sand stone, boated down from Seneca, 14 miles.
12	–	545	9	497	8	96	Do	-	-	-	Granite, from the quarry near lock No. 7; transported by land 2⅓ miles.
13	–	148	9	645	8	104	Do	-	-	-	Granite, from the quarry in the country, mentioned at lock No. 10; transportation by land 4⅓ miles with the exception of the coping and the hollow quoins, which are from Seneca.
14	–	148	9	793	8	112	Do	-	-	-	Granite, one-half from the quarry in the country referred to, lock No. 10, the other half was boated down from a quarry 5 miles distant.
15	3	1740	13	773	8	120	Do	-	-	-	Red sand stone, boated down from Seneca, 9 miles.
16	–	311	13	1084	8	128	Do	-	-	-	
17	–	618	13	1702	8	136	Do	-	-	-	
18	–	178	14	120	8	144	Do	-	-	-	
19	–	134	14	254	9	153	Do	-	-	-	
20	–	198	14	452	8	161	Do	-	-	-	
21	2	623	16	1075	8	169	Do	-	-	-	Red sand stone, boated from Seneca, 6⅓ miles.
22	2	1544	19	859	7	176	Do	-	-	-	Do from Seneca, in part boated 3¼ miles.
23	2	856	21	1715	8½	184½	Do	-	-	-	Do from Seneca, one mile.
24	–	1174	22	1129	8½	193	Do	-	-	-	Do do less than half a mile. The masonry of the upper end of this lock is connected with the masonry of the lower abutment of Seneca aqueduct.
25	8	23	30	1152	8	201	Do	-	-	-	Red sand stone from Seneca, boated 8½ miles.
26	8	1137	39	529	8	209	Do	-	-	-	Red sand stone from Seneca, 17 miles, boated 16¾ miles; land transportation ⅓ mile.
27	2	20	41	549	8	217	Do	-	-	-	Red sand stone, boated down 5 miles from a quarry near the river, 2½ miles below the Point of Rocks, with the exception of the coping, which is from Lee's quarry, near Seneca, &c., a few feet of ashlar, which were obtained by land, 2½ miles from the same quarry, whence stone were obtained for the Monocacy aqueduct.
	To Monoc'y aq. 1156 yards length of do 172 From aq. to pivot bridge at Point of Rocks 6 miles, 1 yard Thence to lock No. 28, 1337 y.		48	118	6	223	Do	-	-	-	One-seventh of the stone was brought 46 miles on the Baltimore and Ohio railroad (at 6 cents per ton per mile) from the granite quarries of the Patapsco, to the Point of Rocks, and was thence wagoned nearly one mile to the lock. The other six-sevenths of the stone was transported in wagons from a quarry of hard white flint stone in Virginia, 4 miles.
28	7	906	48	1415							

A—Continued.

	Location.				Lift, in feet.	Total lockage.	Description of work.	Stone used for the face work, where obtained, &c.
	Distance from lock to lock.		Distance from tide lock at the mouth of Rock creek.					
	Miles.	Yds.	Miles.	Yds.				
Lift lock No. 29	1	1597	50	1292	7	230	Cut work - - -	*Two-thirds* of the stone were obtained from the granite quarries of the Patapsco, in the same manner as for the last lock. The distance of land transportation from the Point of Rocks to the lock was 2⅔ miles; the other third of the face stone was obtained from the quarry in Virginia, referred to at the last lock.
30	4	143	54	1435	8	238	Do - - -	*One-seventh* of the stone of the Patapsco granite, *one-seventh* of stone found scattered through the neighborhood; *five-sevenths* of red sand stone boated 32½ miles from Seneca.
31	3	121	57	1556	8	246	Do - - -	Built of stone from different quarries; a part from the hard white flint stone quarry in Virginia, mentioned at locks Nos. 28 and 29; a part was obtained within half a mile, and a part from a granite quarry in Virginia; the land transportation of which was one mile, and water transportation one and a half mile.
32	2	332	60	128	8	254	Do - - -	*One-fifth* of the stone from the granite quarry referred to at the last lock; the transportation from which was in wagons, distance two miles, crossing the two rivers, Shenandoah and Potomac. Four-fifths of the stone were from different lime stone quarries up the Potomac, varying in distance from 2 to 12 miles, the last mile of which was land transportation, the rest water transportation.

*33	–	760	60	888	8	262	Do - - -	Built mostly of stone from the granite quarry in Virginia, last referred to ; transportation in wagons 1½ mile, crossing the Shenandoah and the Potomac ; a small portion of the stone is from Maryland, one mile distant.
34	–	1556	61	684	8	270	Do - - -	Built of lime stone from a quarry in Virginia, on the shore of the Potomac ; water transportation five miles, land transportation three-quarters of a mile.
35	–	1267	62	191	8	278	Do - - -	Lime stone from quarry last referred to ; transportation five miles by water.
36	–	173	62	364	8	286	Do - - -	Do do do nearly five do.
37	4	909	66	1273	9	295	Do - - -	Do do in Maryland, distant half a mile.
38	5	1426	72	939	5	300	Do - - -	Do do directly opposite on Va. shore of the Potomac.
39	1	287	73	1226	6	306	Do - - -	Do do in Virginia one mile distant.
40	5	1027	79	493	9	315	Do - - -	Do do half mile distant.
To guard lock, No. 3,	6	447	85	940	–	–	Rubble masonry.	
Slack water and tow path to lock No. 41,	6	1710	92	920	10	325	Hammered stone.	
42	–	2000	92	1120	9	334		
43	–	2000	92	1320	9	343	Cut work - - -	Lime stone from a quarry three miles distant ; land transportation.
44	6	1020	99	580	10	353	Do - - -	Do do do do do.
To guard look No. 4,	7	1420	107	240	–	–	Rubble masonry.	
Thence to the entrance of the canal into the Potomac,	–	320	107	560				

*The foot of this lock is connected with the abutment of the bridge over the Potomac at Harper's Ferry.

Dam No. 5 backs up the Potomac about ten miles. The length of slack water navigation, above dam No. 4, is given as it was previous to the change. The length of the level between locks Nos. 42 and 43 is now nearly four miles greater than that given above, and, of course, the slack water is that much less.

Document B.

Specifications of the manner of constructing Aqueduct No. 5, designed to convey the water of the Chesapeake and Ohio canal over Conococheague creek.

The aqueduct will be formed with three arched water ways of sixty feet span each.

There will be two piers and two abutments, the piers will be twelve feet thick at the bottom, and eight feet at the top of the skewback; the abutments will be, each, twelve feet thick, with a buttress projecting five feet from the centre, as represented on the annexed plan. The piers, abutments, and wing walls, shall all be founded on the solid rock that forms the bed of the creek.

The piers will be thirty-two feet long, exclusive of the dome at either end thereof, and these domes will be quarter spheres of eight feet diameter; the piers and abutments will be carried up until within eighteen feet (measured vertically) of the bottom of the canal.

On these piers and abutments will then be erected three arches, thirty-two feet wide, sixty feet span, and fifteen feet rise; the arch stone, or voussoirs, must be of hard, durable stone, and fashioned so, that the first or skewback course, composed of them, shall be three feet, and the crown or key course two and a half feet deep; and these arch stones shall not be less than fourteen inches thick at the nose, or intradors; they must also be so laid in the work, as to break joints, no lap being less than twelve inches, nor shall any arch stone be less than three feet long on its face. The spandrils shall be laid of good large flat stone; and the arches and spandrils shall be grouted in the manner hereinafter mentioned.

On the arches and spandrils shall be erected the parapet walls as follows: the parapet on the towpath side to be seven feet thick at the bottom, and six and a half feet at the top; and that on the berm side to be five feet thick at the bottom, and four and a half feet at the top, and both walls to be raised seven feet above the bottom of the canal.

On the exterior sides of the aqueduct, and between the top of the arches and the parapets, will be inserted a water table or string course, eight inches thick in the main, levelled to six inches on the face, and the whole to be two feet broad, and project six inches beyond the face of the parapet.

The parapet and wing walls will be covered with a coping of stone ten inches thick, and projecting on the exterior surface of the wall six inches.

The wing walls shall be built of the form and thickness shown on the annexed plan, and the manner of building them shall be similar to that prescribed for the parapets.

The stone for the arches, the ends of the piers and abutments, the skewback, the water table, the domes and coping of the parapets and wings, shall be well and smoothly cut, and all the remaining face stone, both for the waterways and exterior faces, shall be of good hammer-dressed range work.

No course of stone will be permitted to enter either the abutments or piers, that shall be less than fourteen inches thick, with a bed two feet broad; nor will any course be permitted to enter any part of the work, that shall be less than ten inches thick, and have a bed less than eighteen inches broad. There must be a header or bond stone at each ten feet in length of every course, and each header must be at least three feet long on the face.

The bottom of the trunk (or water way) between the parapet walls shall be laid with approved hard burned brick, laid on the edge, and bedded in a good bed of cement mortar, one inch deep, and the grout made to fill between the bricks half an inch above their upper side. This floor of brick to extend entirely between the parapets, and from outside to outside of the abutments.

The whole of the masonry shall be laid in cement mortar or grouted, or both, as may be directed by the engineer; the grout and mortar shall be composed of equal parts of clear, sharp sand and approved hydraulic lime, except the wings, in which the grout may be composed of two parts sand to one of water lime. The grouting shall be done at each course in height as the walls progress. Iron rods and clamps, to connect the arch and other stones, shall be inserted when required by the engineers, and every part of the work shall be done under his inspection, and any part thereof taken down and rebuilt that he shall not approve.

Document C.

Specification of the manner of constructing dam No. 4, at section No. 156, of the Chesapeake and Ohio canal.

The manner of building the dam will be as follows:

All the earth, gravel, and loose stones shall be first removed from the place to be occupied by the foundation timbers, and on the solid rock shall be laid and firmly bolted, with iron bolts, three rows of timber 12 inches square, 30 feet apart, and extending entirely across the river. These timbers shall be accurately fitted to the rock, especially the up stream log, which shall be scribed and fitted so as to be as nearly water tight as practicable.

These foundation timbers shall be bolted, at each 10 feet of their length, with iron bolts $1\frac{1}{2}$ inches square, passing through the timber and penetrating the rock not less than two feet; the lower end of the bolts to be fastened with reversed iron wedges.

On the down stream side of the dam an apron must be formed by laying timbers 12 inches thick, not less than 12 inches broad, and 15 feet long, with their edges in contact, their upper ends abutting against the lower transverse timber, and their direction being with the stream, or at right angles to the dam; in this position they must be securely bolted to the rock, with not less than two bolts to each timber, said bolts to be of the size and length before described.

After the three rows of timber, first mentioned, have been securely fastened to the rock, they shall be connected together by sound white oak ties 32 feet long, 10 inches diameter, dovetailed at each end; and the dovetails must be accurately and tightly fitted into the tenons made in the timbers to receive them.

Wherever a tie connects with a timber, it must be fastened with a locust pin of two inches in diameter, and 24 inches long. These ties must be inserted in every course of timbers at each 10 feet in length of the dam: the first eight or ten courses of ties will be secured alternately to the timbers and the rock at the bottom of the river; when to the latter, the ends will be bolted as before described.

When the first mentioned three rows of timber, extending across the river, shall have been bolted to the rock, and secured together by the ties, another course of timbers shall be laid on them so fitted that the space between the under side of one timber, and the upper side of the other, shall not be more than one inch. The centre and up stream logs shall be carried up plumb one over the other; but the down stream side or course shall each recede six inches up stream from the face of the log next below, thus forming on the lower side of the dam a succession of steps; in this manner the last laid course of timbers must be secured to the timber underneath by locust pins, driven at the distance of 16 feet apart; these pins to be two inches in diameter and thirty inches long, with a reversed wedge in their lower ends. This course of timber will then be tenoned and secured by dovetailed ties in the same manner as directed in the last course.

In this manner the dam will progress until the down stream side is eighteen inches below its intended height, and the up stream is 18 feet lower than the down stream side, and the whole space between the timbers, and under the ties, being filled, as it progresses, with stone well packed away. On the sloping surface, now presented by the dam, when thus far formed, shall be securely bolted to the timbers a course of ties ten inches thick, flattened on the upper side.

These ties will be placed at intervals of four feet, and must be fifty-two feet long. They must be braced from the timbers forming the cribs, so as to sustain them on the centre; these braces to be ten inches thick, and placed at an angle of forty-five degrees. The centre course of timbers must be braced from its upper log to the lower log of the down stream side.

On the last mentioned course of ties, must be framed and fitted fifteen courses of white oak timber twelve by six inches, be flush with the face of the ties, and fastened to said ties with ten inch locust pins at their intersection with every tie.

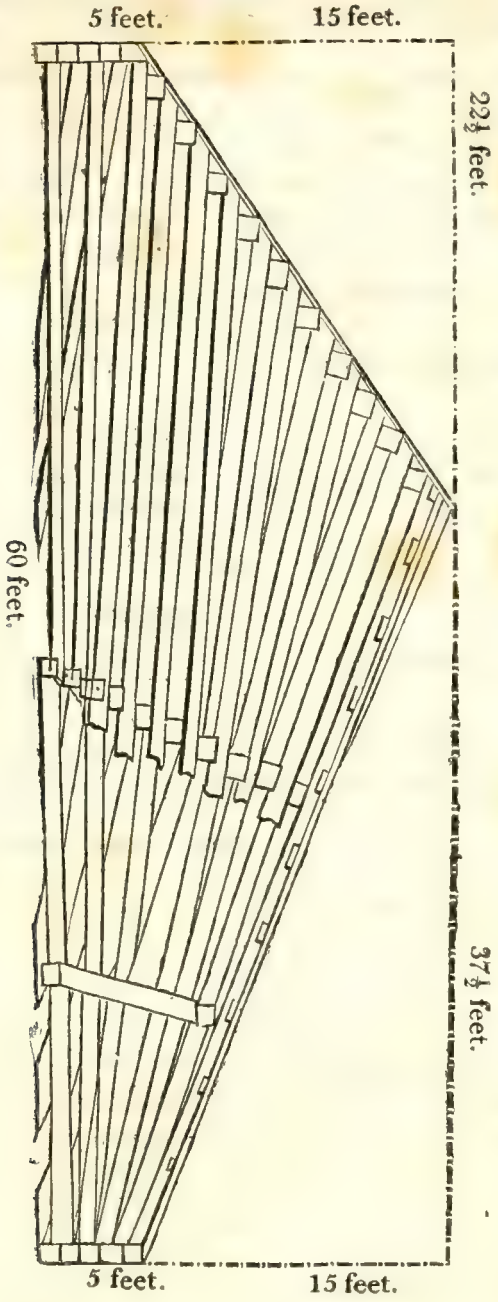
The point of the dam, on the up stream side, must be sheet piled with two inch plank, well scribed and fitted to the rock at the bottom of the river. The whole upper surface of the dam must be covered with four inch plank well and tightly jointed. These planks to be secured with nine inch wrought iron spikes; on the top of these planks must be secured ice guards four inches thick at the butt, and tapering to an edge, each guard plank to be twelve feet long, and to be fastened with fifteen inch wrought iron spikes.

The up stream side of the dam will be well gravelled.

There will be an abutment only on the Maryland end of the dam, built of good rubble masonry laid in water proof cement.

The engineer shall, at any time, have the right to increase or diminish the quantity of iron used, and to reject any timber or plank he may consider unfit for the work.

Sketch of dams Nos. 4 and 5, according to the altered plan.



State of the canal on the 1st of May, 1833, according to the quarterly report of the resident engineers, Messrs. Cruger and Purcell.

Aggregate cost of the canal from section 85 to 112, inclusive.

Description of work.	Work done.	Work to be done.	Totals.
9 Flumes, - - -	-	2,700	2,700
8 Lock houses, - - -	200	6,200	6,400
4 Waste weirs, - - -	500	1,100	1,600
3 Pivot bridges, 1 draw bridge, and 1 ferry, - - -	800	3,300	4,100
Towing path and flume bridges, -	25	375	400
Turnpike road, - - -	-	4,500	4,500
Construction of canal, - -	274,763	48,542	323,305
locks, - -	85,361	42,775	128,136
culverts, -	35,883	525	36,405
Catoctin aqueduct, - -	28,341	2,738	31,079
Totals, - - -	425,873	112,755	538,628
Deduct 2 locks above public dam,	2,888	18,210	21,098
Total cost below do. -	422,985	94,545	517,530

Aggregate cost of the canal from section 113 to 132, inclusive.

Description of work.	Work done.	Work to be done.	Totals.
2 Flumes, - - -	-	600	600
1 Lock house, - - -	-	800	800
1 Pivot bridge, - - -	-	200	200
Road by sections 123 and 124, -	1,502	-	1,502
Construction of canal, - -	63,645	39,978	103,623
locks & Antietam aqueduct	24,805	17,965	42,770
culverts, - -	7,988	4,784	12,772
Totals, - . -	98,940	64,327	163,267
Add 2 locks above public dam, -	2,888	18,210	21,098
Total cost do. do. -	101,828	82,537	184,365

General Summary of work done and work to be done on canal, from section 85 to 132, inclusive.

	Work done.	To be done.	Totals.
Total cost below public dam to section 85, - - -	422,985	94,545	517,530
Total cost above public dam to section 132, - - -	101,828	82,537	184,365
Total cost from section 85 to 132, inclusive, - - -	524,813	177,082	701,895

After having deducted two locks and part of section 112, lying above the public dam, the cost of the work to be done necessary for the admission of water, amounted on the 1st of May to the sum of $70,568, which is reduced by the amount of work done up to this date (May 24) to $40,000.

$20,000 of the cost of the canal below the public dam is chargeable to the sum appropriated in the compromise with the Railroad Company for the construction of the railroad. The masonry of all the locks will be completed below the public dam by the 1st of June, except one which will be completed by the 5th: the culverts are entirely finished.

The above statements and tables are correct.

ALFRED CRUGER,
Resident Engineer.

May 28, 1833.

General Summary of work done and work to be done on the canal from section 133 *to* 202, *inclusive.*

Description of work.	Work done.	To be done.	Totals.
Sections, - - -	195,362 82¼	332,660 18¾	528,023 01
Locks, - - - -	15,992 98	58,098 30	74,091 28
Culverts, - - -	8,376 14	23,147 80	31,523 94
Aqueduct, - - -	10,245 20	30,014 80	40,260 00
Dams, - - - -	12,388 12	70,064 14	82,452 26
Incidental work, - - -	14,000 00	27,750 00	41,750 00
Total cost of canal from section 133 to 202, inclusive, - -	256,365 26¼	541,735 22¾	798,100 49
Cost of the canal between the head of Harper's Ferry falls and section 133, - - -	101,828 00	82,537 00	184,365 00
Total cost of the canal from the 112th to the 203d section, in distance 39 miles, - - -	358,193 26¼	624,272 22¾	982,465 49

The above is extracted from the report of Thomas F. Purcell, resident engineer of the part of the canal above the 132d section, which terminates opposite to Shepherdstown.

D.

Amount of retained money in the hands of the company, on the 31*st December*, 1833, *payable when the work on which it is held back shall be completed.*

On that portion of the Chesapeake and Ohio canal from the Point of Rocks to the head of Harper's Ferry falls, - -	16,491 70
Thence to dam No. 4, (included,) - - -	58,449 21
Thence to dam No. 5, - - - -	58,794 63
	$133,735 54

Canal Office, 31*st December*, 1833.

E & H.

COST OF THE CANAL.

In reviewing the historical narrative, in the report, of the sums and dates of the various disbursements, which compose the entire cost of the Chesapeake and Ohio canal, the following details are supplied viz.

For the construction of the canal, there had been expended on the 31st of December, 1833, - -	$3,177,826	99
And there remained to be expended to complete the 109 miles next above Tiber creek, - - - -	449,169	51
To which sums, should be added, on account of the retained money on the estimates, for work done, rendered to the 1st of January, 1834, - - - - -	133,735	54
Making the sum total, for the construction of the various works, - - - - - - - -	3,760,732	04
Add for land purchases and condemnations, including the sum of $18,528 38, for unsatisfied claims and future assessments of damages, - - - - -	190,000	00
For contingent expenses including officers and engineers' salaries, stationery, printing, postages, law expenses, &c., including an allowance of $22,339 20, for similar expenses, from the 1st of January, 1834, until the 109 miles, under contract, shall have been completed, -	214,000	00
	$4,164,732	04
Of this sum, there had been expended on the 31st January last, pursuant to the compromise of the stockholders made in September, 1828, which fixed the eastern termination of the canal at the mouth of Tiber creek, exclusive of any charge for contingencies, or for lands and lots purchased or condemned, on the part of the canal, about four miles in length, between the old locks of the "Potomac Company" and the tide lock in the city of Washington, - - - - - -	476,744	71
Add to this sum, for the proportion of the contingent expenses of the entire 109 miles, justly chargeable to this portion of the work, being at least five per cent. on its cost, - - - - - -	23,837	23½
And the actual cost, ascertained on the 31st of December last, of the lands and lots purchased or assessed by a jury, for those four miles, - - -	65,491	03
And the total cost of those four miles will appear to be -	566,072	97½

Deducting this sum from the total cost of the 109 miles, and the 105 miles above the old locks will cost, it will be seen, 3,598,659 03½, or $34,272 94⅗ per mile.

If the three miles of towpath along the slack water navigation immediately above the 4th dam be deducted, then, the remaining 102 will have cost, when completed, $35,282 94⅖ per mile.

If the ten miles of slack water navigation above dam No. 5, be added, and also the three miles excluded from the last estimate, the entire line of

115 miles of improved navigation above the old Potomac locks affording six feet depth of water, will have cost, when completed, $31,292 64 per mile.

If to the four miles below the old locks, there be added the sections F & H, lettered in the following tables, and the first thirty-five of the numbered sections in the first of those tables which reach the Seneca basin, or a distance of twenty-three miles above the mouth of Tiber creek, and a suitable allowance be made for lands purchased or obtained by assessment on this part of the canal, together with five per cent. for its share of the contingent expenses, there will result the aggregate sum of $1,530,004 $14\frac{5}{10}$, as the measure of its cost, leaving the sum of $2,634,727 $89\frac{4}{10}$ for the cost of the residue of the canal; so that while the first twenty-three or more nearly twenty-three and a half miles of canal will have cost $65,106 55 per mile, the remaining eighty-five and a half miles will have cost, when completed, $30,815 53 per mile.

But for the extension of the canal below the old locks, its cost would have left of the six millions, at which the eastern section is here computed, the sum of $2,401,340 $96\frac{1}{2}$: a much larger amount, than the construction of the eighty miles above the dam No. 5 will require. And since the Board of Internal Improvement computed the cost of the two and a half miles below those locks at but $173,285 60, there exists, in this view, a greater disproportion between the estimated and the actual cost of this canal, in favor of the latter, than has been stated in the text of this report.

It is proper to remark, however, that the cost of the five locks erected in Georgetown, below the basin which those engineers proposed to construct at the market-house in that town, is computed at $55,500 in their estimate of the cost of their 10th subdivision, which they terminated at the old locks. To this extent, therefore, their estimate of the work above should have credit.

On reviewing the proceedings of the Canal Company in relation to its eastern termination, the committee find the circumstances attending this measure fully disclosed in the proceedings of the stockholders, detailed in the appendix of the first annual report of the President and Directors.

The committee are apprised that no act of those on whom the administration of the affairs of the company was devolved, has been the subject of more frequent criticism, than this; which was, however, that of the stockholders themselves, overruling and controlling the judgment of the President and a majority of the directors of the company.

The obligations of the company to extend the canal, at some period or other, as far at least as Georgetown, are stated in a succeeding note of this appendix, (see K.) Its inexpediency, therefore, applies to the time and not the mode of this extension. As the revenue of the company depends on reaching the coal fields of the Potomac, it was desirable that the resources of the canal should be husbanded for this object, and the temporary inconvenience of entering the Potomac through the old locks submitted to, until this object was accomplished.

In addition to the notice of this subject in the fifth annual report, already included in this appendix, the following allusion to it in the annual report of 1829 is subjoined, with an extract from the proceedings of the stockholders at the extra meeting in September, 1828; which was convened, as the committee are informed, at the instance of the two Washington directors, for the sole purpose of fixing, as was ultimately done, the eastern termination of the canal.

"In the final adjustment of all the details of the plan, approved by the general meeting, for fixing the termination of the canal, a reference was kept in view to all the provisions of the *recent compromise between the District corporations*, which had led to the settlement of the most embarrassing question to the Board, that has occurred since its first institution. Ground has been provided for the eastern abutment of the Alexandria aqueduct; and such an elevation is proposed to be given to the water of the Rock creek basin, as, while it saves the cost of much excavation, will ensure to the present and future canals of Washington, at all times, an adequate supply of water at such a level as its corporate authority may hereafter prefer." This report further states, "that, by the *decision of the stockholders*, at their extra meeting, the canal was extended but 2,276 feet beyond the point required by the act of Congress, as well as by the interest of the principal parties to the charter of the company."

The following extract is from the report of a committee of the stockholders to the same general meeting: "The act of Congress authorizing a subscription to the stock of the company, contains a proviso which is in the nature of a condition, which prescribes the elevation of a section of this canal from the head of the Little falls to the proposed basin next above Georgetown. Wherever that basin was contemplated, whether at the ravine at the western extremity of Georgetown, or, as appears more probable, in the very heart of the city, it is obvious that the canal was then contemplated by the National Legislature to extend three miles below the head of the tide.

"The committee will refrain from entering into a minute examination of the proceedings of the various conventions which gave birth to this institution; to the various reports made by the engineers to the War Department; all of which show that, whenever this project was the subject of discussion, its eastern termination was never contemplated to be higher up the river than Georgetown; and that the expression 'from tide water,' was never understood by any one to mean the point where the tide terminates.

"Believing, as the committee do, that no reasonable doubt can exist as to the meaning of the laws and the rights of the company under the charter, they now approach the question of expediency with as little doubt of the correctness of the conclusions to which they have been brought.

"The circumstance is of too recent a date, and the consequences involved were too important, to justify the belief that any one can have forgotten the memorable controversy which, within the last year, threatened the existence of this institution, and which has long since been supposed to have been satisfactorily adjusted and forever closed. The city of Washington, one of the largest subscribers to the stock of the company, and many individual subscribers within the limits of that corporation, entertained apprehensions that such a selection would be made for the eastern termination of the canal as would seriously conflict with their interests. Having connected themselves with the institution under a settled understanding, in which they had every reason to believe all participated, that the canal was to terminate within the chartered limits of the city, and finding no steps taken to ascertain the precise point of that termination, they adopted the measures which have been already promulgated. The consequence was, that a general meeting of the stockholders was convened to be held on the 3d of September last, and which was continued by adjournment until the 10th of the same month. At this meeting an arrangement was made in the

spirit of compromise, which, among the parties between whom it was effected, was believed to put this question forever to rest. It was the result of mutual concession, and the Government of the United States, holding stock to a large amount, and in that capacity alone feeling any interest in the result, exercised with paternal solicitude the influence which its votes commanded in favor of the contemplated arrangement, which was carried by a majority so large as to approximate closely to unanimity. Relying upon the assurance given by this vote of approval, and believing, with the utmost confidence, that it was substantially a solemn compact which could not be violated, without the most serious necessity, the Corporation of Washington, and the individual subscribers, have paid up their instalments with great punctuality. With a full knowledge of the subject, and anxious to comply with this arrangement, the other corporations and stockholders have also paid into the treasury of the company the various sums which have been called for from them.

"It is now asked to set aside all these solemn, and, as the committee believe, sacred contracts. It is objected, in the first place, that this arrangement was made at a large meeting of the stockholders, representing a vast majority of the stock, specially summoned to meet and deliberate upon this identical question. That it is proposed to reconsider and annul it at a meeting called under the charter for other purposes, and without any notification that this question would be raised. Nor is this all: it was early intimated by the President and Directors, that, as soon as the question should be settled, measures would be adopted to carry the canal to its eastern termination. This suggestion was received without dissent or objection, and, under this strongly implied sanction to the measure, contracts have been made for the completion of this portion of the canal without unnecessary delay."

In another part of the report of the committee, the following letters from the engineer-in-chief, and the three engineers of division, including the engineer-in-chief of the canal, are referred to, among the grounds of their approval of the extension of the canal to Rock creek. To the inquiry, "what advantages will the basin at Rock creek possess over that contemplated at or above Georgetown?" the reply of Mr. Benjamin Wright is as follows: "The comparative expense is stated in the answer to the first question. The usefulness and advantages are apparent, when I state that the one has ten times the capacity and convenience of the other, in its being accessible by land through the present streets, and others which will be formed; that it presents shores where boats can lie afloat for a mile and a half on its two sides; that the upper part will be a cheap and safe place for boats to lie when not in use; or for rafts of timber waiting for a market; and for lumber yards, easily accessible, and very important. The lower part, or mole, will be very valuable, as being a ship wharf on one side, and a boat wharf on the other, and warehouses may be established on the shores and on the mole, so as to receive the lading of the boat at one end, and pass it out to the ship at the other, in such numbers as to bring competition in their use to prevent monopoly; in short, it gives great facilities for transhipment of property at the least possible expense.

"On the other hand, if a small basin was formed near the market, it could not hold more than thirty or forty boats, and would present no facilities for the cheap transhipment of property. The boat used on the canal must descend into the river to meet the vessel, and be exposed to storms; the

warehouses around the basin would be limited, and, of course monopolized *if profitable.* The warehouse could never be so situated as to receive the lading of the boat at one end and pass it out to the ship at the other, if the weather did not permit the boat to come alongside of the ship.

"If I was to give a comparative opinion of the value of the one compared with the other, I should readily declare that the Rock creek basin was worth, and would sell for more than its whole cost, when the other would not sell for a dollar. This is placing the whole matter on a comparative view of their worth; but I would place it in another point, and say boldly, that, in my own opinion, this great work, if prosecuted to its intended extent, cannot be prosperous without this basin, in giving that ready and cheap facility to transhipment of property which is calculated to reduce the expenses to its minimum value; and at no other place along the Potomac river, at or above Georgetown, have I been able to discover a place which will give equal advantages without a much greater expense. The committee will recollect, that in forming a basin along the margin of the river above Georgetown, there must be a great amount of excavation of rock and earth, and I know of no place where a deposite of this excavation could be permitted."

"BENJ. WRIGHT."

"*June* 5, 1829."

"*To the President and Directors of the Chesapeake and Ohio Canal:*

"GENTLEMEN: The Board of Engineers having been requested by you to give their opinion on the comparative advantages of terminating the canal at Rock creek, or at any other point about it, beg leave to remark:

"Assuming, what hardly any person will doubt, that a basin is necessary and useful, and we may say an almost indispensable appendage to a canal of such magnitude and importance as the Chesapeake and Ohio canal; knowing, as we do, the great advantages and facilities which they give to the use of such works; and knowing that the plans of the United States engineers contemplated a basin in Georgetown, although they had not been specially charged to report upon such an appendage, but from their skill and good judgment, their minds were decided upon the importance of a basin at the termination of the canal: assuming these premises, the question is, where can a basin be formed with the best economy, combining the greatest advantages, and giving the greatest benefits and facilities to the use of the canal? We can readily answer, that, in our opinion, the mouth of Rock creek unites more advantages, is more economical and more useful, and gives greater facilities than any other place between that point and the head of tide water. The advantages of a basin at any other place above Georgetown, would tend to remove the business to it, and injure or destroy Georgetown and Washington, so far as to make the vessels which navigate the Potomac below Georgetown, go up to the basin to receive and deposite their lading: the warehouses would be there, and the business of the canal would be there.

"It may be said by some persons not conversant with the form and construction and manner of using the most approved canal boats, that the boats might descend into the river at some point below the old locks, and float down, or be towed down, to Washington or Georgetown and Alexandria. This, it is true, might be done, but it would be attended with risk and extra expense and delay, and would be found very inconvenient and injurious to the economy and usefulness of this great undertaking.

"It may be said that it is expensive forcing the canal through Georgetown: this is true; but it ought to be considered, that as there has been no plan by any engineer contemplated without a basin, as the United States engineers contemplated a basin near the market in Georgetown: the question arises, whether the advantages of carrying the canal from the market to Rock creek are not greater than all the expenses. We believe that the value of the mole and basin at Rock creek, when completed, will be much greater than the expense of making the canal and mole from the market to Rock creek. We believe it money well laid out or invested; if the company choose to sell their right and privileges on the mole and basin, (and without interfering in any way with the navigation of the canal,) more money might be obtained for these than the cost of canal and mole, exclusive of lockage.

"We have examined the shore of the Potomac at the market in Georgetown, and from thence up to the Little falls, and we do not see how a basin of any size or magnitude can be formed along the shore of the river without very great expense; and when done, would be very inconvenient.

"If the city of Washington wishes to participate in the trade of the canal, upon equal grounds with her neighbors, there is no so good plan can be projected with so little expense as the carrying the canal to Rock creek, and thence to the Tiber.

"Believing, as we do, that to follow the words and spirit of the charter of Maryland and Virginia, to give all possible advantages to a continuation of the canal to Baltimore, or elsewhere, through the District of Columbia, a high level as far eastward toward Rock creek as possible, was proper and right, we never had a doubt of the propriety of bringing the highest possible level from the head of the Little falls to Georgetown, and there locking down into Rock creek, keeping the level of the water at the head of the Little falls as near to Rock creek as possible, in order to its continuance on the same level towards Baltimore or to the navy yard; either of which projects are of great importance, and probably will be executed before many years.

"We might recapitulate many other reasons which have been advanced, to show that this plan is the best and most advantageous to the stockholders and to the community at large, but we defer it.

Respectfully submitted.

"JOHN MARTINEAU,
"N. S. ROBERTS,
"BENJ. WRIGHT,
"*Board of Engineers, Ches. and Ohio Canal.*

"*September* 3, 1829."

These letters are of a date long subsequent to the meeting which fixed the termination of the canal. In the same appendix there occurs the following paragraphs in relation to the transactions of that meeting:

"Pursuant to public notice, a general meeting was held on Wednesday, September 10, at the City Hall in this city, of the stockholders of the Chesapeake and Ohio canal. A very large proportion of the stock was represented, and there were present at the meeting above four hundred persons.

"The Mayor of the city of Washington was called to the chair, and J. [illegible]. Ingle appointed Secretary:

"The President of the Canal Company presented and read the following report from the President and Directors of the Company:

"The President and Directors of the Chesapeake and Ohio Canal Company, at the instance of the directors residing within the city of Washington, have convened a general meeting of the stockholders, in conformity to the provisions of the charter and by-laws of the company, in order to submit to their judgment the proper point for the eastern termination of the canal.

"It is due to themselves, as well as to the general meeting, to state, that the Board, for reasons satisfactory to a *majority of their members*, had, by a prior resolution, declared it to be their opinion, that it was *inexpedient* to settle the question at present. A part of the Board had peculiar reasons for that determination, which did not militate against an immediate submission of the subject to the stockholders: and the urgency with which a decision upon this question was understood to be pressed, by a considerable portion, in interest, of the subscribers to the stock of the company, overcame any reluctance which the Board might otherwise have felt to convene a general meeting, so soon after the organization of the company.

"In anticipation of the deliberations of the stockholders, upon the subject which is now submitted to them, efforts have been diligently and perseveringly made by the President and Directors, to harmonize the various local interests involved in the decision of it. Of these efforts, the proceedings of the Board afford the best evidence. It will be found, in the resolution of the Board, of the 9th of August, in the report of the committee to which this resolution was referred, and in the unanimous decision of the Board upon that report.

"It is for the general meeting to approve, to reject, or to modify the compromise presented by the last resolution.

"The President and Directors, however, take this occasion to suggest, that, as the next contracts for the construction of the canal will embrace the entire line, from the Little falls to the Catoctin mountain, and will require so much of the canal to be completed by the end of the ensuing year, but little loss will be sustained by the company, from extending the canal to its eastern termination, as soon as practicable, after that is fixed by the definitive judgment of the stockholders."

This resolution, in a subsequent page of the appendix, is noticed in the following words:

"The first resolution moved at the last meeting of the stockholders being then under consideration, as follows:

"*Resolved by the stockholders of the Chesapeake and Ohio Canal Company in General Meeting*, That, in the event that the Attorney General of the United States shall be of opinion that the charter of the company confers authority therefor, *and the corporations of Washington, Georgetown, and Alexandria, shall respectively assent thereto,* the canal shall be extended to the mouth of Rock creek, on the plan submitted to the President and Directors of the Company by the engineers, Benjamin Wright and John Martineau; and that, so soon as the corporation of Washington shall have provided, at the mouth of Tiber creek, a basin of sufficient elevation above the tide to receive a canal leading thereto from the mouth of Rock creek, at the height of three feet above the ordinary high tide of Potomac river, the Chesapeake and Ohio canal shall terminate therein, in the mode provided by the plan submitted to the President and Directors of the company

by the said engineers: *Provided, however,* That, if the corporation of Washington shall prefer the construction of the canal from the mouth of Rock creek to the Tiber, it shall have liberty to do so at any time before the said canal shall have been begun by the Chesapeake and Ohio Canal Company.

"The Mayor of Alexandria (Th. F. Mason, Esq.) moved to amend the same, by striking out the words following, viz.

"'And the corporations of Washington, Georgetown, and Alexandria, shall respectively assent thereto.'

"And the question was determined in the affirmative—Yeas 4,051, Nays 528.

"The question was then taken on the said first resolution, as amended, and decided in the affirmative—Yeas 4,561, Nays 538."

An official statement, showing the cost of construction of the sections from A to E, and of I and K, with the incidental works thereon, so far as the same have been estimated or paid, to 31st December, 1833.

Section A,	aggregate amount,	$219,108 01
Space between A & B,		12,402 11
Section B,		116,681 64
C,		23,220 50
D,		12,804 54
E,		13,777 89
I,		26,364 82
K,		52,385 20
		$476,744 71

Which comprehends the whole work between the old locks at the Little falls, and the mouth of Tiber creek, and is exclusive of acquisition of land, and claims yet unsettled.

The cost of acquisition of land, on which to locate the canal within the same limits as are the basis of the foregoing statement, as nearly as can be distinctly ascertained, is - - - - $ 65,491 03

The general aggregate of "construction," -	476,744 71
"Acquisition of lands," - - - -	65,491 03
From the old locks, at the Little falls, to the mouth of Tiber creek,* - - - -	542,235 74

To December 31, 1833.

"Repairs," specific, to November 30, 1833, -	26,919 90
Repairs and improvements, general - -	55,684 20
Total,	$82,604 10

* The above amount includes no part of the contingent expenses chargeable on the work done.

ABSTRACT of receipts and expenditures on account of the Chesa-

1833. Dec. 31.	To capital stock, for amount of instalments paid to date, agreeably to returns received		3,589,252 64
	To unclaimed dividends of the Potomac Company, received from the late treasurer, for account of sundry stockholders		*d* 366 30
	To Potomac Company, received from the late treasurer	131 87	
	To Potomac Company, received from J. Strider, a balance due from him	237 30	
	To Potomac Company, received from Jacob Payne	36 18	
	To Potomac Company, received for old iron sold	13 17	*d* 418 52
	To toll account, received to date		94,538 27
	To acquisition of lands, received from T. C. Wright, for old houses condemned and sold	*a* 357 60	
	To do. for balance of money advanced, refunded	*b* 672 31	1,029 91
	To profit and loss for interest and gain on sale of Maryland stock		4,703 08
	To interest account, recovered from delinquent stockholders		989 79
	To law expenses and costs of suit, from delinquent stockholders	*c* 329 61	
	To law expenses, for balance of money advanced, refunded	*b* 80 00	
	To law expenses, Baltimore and Ohio Railroad Company, for costs of suit awarded in courts of Maryland	*c* 1,017 77	1,427 38
	To construction of the canal, received for materials sold	82 80	
	To do. rent of saw mill at Great falls	75 00	*a* 157 20
	To Engineer Department, received of Baltimore and Ohio Railroad Company for costs of survey, awarded by the court		*e* 2,500 24
	To Baltimore and Ohio Railroad Company, on account of agreement for continuation of the road		177,333 35
	To bills payable for discounts at the Bank of the Metropolis	44,000 00	
	To Office Bank United States, Washington	11,000 00	55,000 00
			3,927,716 63

peake and Ohio Canal Company, to the 31st day of December, 1833.

1833. Dec. 31.	By requisition paid and charged to Corporation of Washington	175,000 00	
	By requisition paid and charged to Corporation of Georgetown	43,750 00	
	By contingent expenses of Chesapeake and Ohio Canal Co.	13,116 93	
	By pay of officers	41,876 29	
	By construction of the canal	3,325,908 65	
	By Engineer Department	115,942 22	
	By western section	4,026 08	
	By stationery	1,572 00	
	By printing	6,049 58	
	By postages	406 50	
	By toll account	838 43	
	By acquisition of lands	171,471 62	
	By law expenses	13,197 18	
	By Potomac Company	9,831 72	
	By Potomac Company, unclaimed dividends	5 55	
	By interest account	3,019 68	
			3,926,012 43
	By balances to the credit of the Chesapeake and Ohio Canal Company in Office Bank U. S.	19 22	
	By Bank of Washington	458 50	
	By Bank of the Metropolis	842 38	
	By Bank of Alexandria	15 48	
	By Bank of Potomac	53 47	
	By Office Bank of the Valley, Charlestown	282 55	
	By Office Bank of the Valley, Leesburg	13 50	
	By Hagerstown Bank	184 86	
		1,869 96	
	Deduct the following overdrafts :		
	Patriotic Bank - 161,92		
	Farmers' and Mech. Bank 3,84		
		165 76	
			1,704 20
			$3,927,716 63

TREASURER'S OFFICE, CHES. & O. CANAL CO.
Georgetown, January 2, 1834.

C. SMITH, *Treasurer.*

E. & H.

[The five tables which follow comprehend the work done and remaining to be done on the 31st of March, 1834, on 108¾ miles of the Chesapeake and Ohio canal, being the portion of the eastern section between Tiber creek, in Washington, and dam No. 5, eight miles above Williamsport, in Maryland.]

No. 1.—A tabular statement of the cost of the works from the mouth of Tiber creek, in Washington, to the mouth of Seneca creek, so far as the same have been paid or estimated. The first 10 sections are inserted in the table in the order of their actual position, but lettered, beginning with A, in the order of their construction; the residue are numbered in the order of their position and construction.

Sections.		Locks.		Lock houses.		Bridges.		Culverts.		Waste weirs.	Dams, &c.	Done.	To be done.	Total.
I.	15,147 18	B.	10,105 30	–	–	Lock B	270 00	–	–	–	–	25,522 48		
K.	34,315 00	Guard	674 47	–	–	D stop	752 20	–	–	–	–	42,346 00		
						G "	5,432 85							
						27th "	1,171 48							
A.	67,742 86	1 to 4	34,052 08	2	120 02	1 & 2	11,470 36	–	–	10,115 78				
		Tide	16,620 42	–	–	Lock	9,025 15			Mole	41,899 46	208,587 87		
										Basin	16,733 59			
										Causeway	808 37			
Market space	7,969 82	–	–	–	–	–	–	A	4,432 29	–	–	12,402 11		
B.	103,301 69	–	–	–	–	3 & 4	1,602 68	B & C	9,734 96	2,027 81	–	116,667 14		
								Culvert C is a viaduct.						
C.	23,220 50	–	–	–	–	–	–	–	–	–	–	23,220 50		
D.	12,124 54	Stop	680 00	–	–	–	–	–	–	–	–	12,804 54		
E.	5,712 59	–	–	–	–	–	–	H	931 75	1,059 08	–	13,777 89		
							A viaduct		6,074 47					
F.	11,967 07	–	–	–	–	–	–	I	1,392 15	920 76	–	14,279 98		
G. H.	32,896 03	Guard	3,197 82	–	–	To Little falls	2,218 73	K	3,578 21	601 90	–	42,492 69		
1	12,193 88	5 and 6	18,985 67	3 & 4	1,432 03	–	–	–	–	–	1, 37,091 30	69,702 88		
2	12,230 35	–	–	–	–	–	–	2	593 50	790 20	–	13,614 05		
3	15,939 78	–	–	–	–	–	–	–	–	–	–	15,939 78		
4	8,571 42	7	9,493 43	5	720 00	–	–	–	–	–	–	18,784 85		
5	7,607 47	–	–	–	–	–	–	5	803 60	391 04	–	8,802 11		
6	12,809 86	–	–	–	–	–	–	8	3,623 87	837 93	–	17,271 66		

7	13,001 28	8	9,043 14	6	785 75	–	–	9	762 59	–	–	23,592 76	
8	13,839 69	9 10 11	32,575 35	7 & 8	1,563 98	–	–	10 & 12	7,225 82	–	–	55,204 84	
								12 is via	duct.				
9	8,275 84	12 13 14	29,905 10	9	836 74	–	–	–	–	444 80	Feeder 198 60	39,661 08	
10	7,432 65	–	–	–	–	–	–	14	572 08	–	–	8,004 73	
11	8,769 47	–	–	–	–	–	–	15	2,079 98	34 35	–	10,883 80	
								Viaduct					
12	22,382 33	–	–	–	–	–	–	–	–	–	–	22,382 33	
13	43,997 78	–	–	–	–	–	–	–	–	–	–	43,997 78	
14	12,669 57	–	–	–	–	–	–	17	1,070 07	–	–	13,739 64	
15	50,688 07	–	–	–	–	–	–	18	760 38	–	–	51,448 45	
16	16,792 58	–	–	–	–	–	–	–	–	–	–	16,792 58	
17	12,691 88	15 16	20,932 47	10	818 25	–	–	–		1,304 02	–	35,746 62	
18	30,960 73	17 to 20	42,618 70	11 12	6,452 27	–	–	–	–	–	G. F. 2,110 45	82,142 15	
19	5,490 88	–	–	–	–	–	–	–	–	300 53	–	5,791 41	
20	6,042 73	–	–	–	–	–	–	21	665 40	–	–	6,708 13	
21	4,075 72	–	–	–	–	–	–	22	734 00	–	–	4,809 72	
22	25,344 54	–	–	–	–	–	–	–	–	–	–	25,344 54	
23	10,814 82	22	8,327 76	13	765 00	–	–	–	–	429 12	–	20,336 70	
24	6,711 42	–	–	–	–	–	–	23, 24½	1,595 75	–	–	8,307 17	
25	4,104 71	–	–	–	–	–	–	–	–	–	–	4,104 71	
26	22,542 24	–	–	–	–	–	–	25	4,780 29	–	–	27,322 53	
27	16,419 64	–	–	–	–	–	–	–	–	–	–	16,419 64	
28	17,716 58	–	–	–	–	–	–	–	–	–	–	17,716 58	
29	10,598 52	22	7,969 28	14	853 20	–	–	–	–	239 92	–	19,660 63	
30	4,385 00	–	–	–	–	–	–	30	1,933 00	–	–	6,318 00	
31	5,137 85	–	–	–	–	–	–	31	482 90	–	–	5,620 75	
32	28,013 12	–	–	–	–	–	–	31½, 32	1,859 25	–	–	29,872 37	
33	16,576 29	–	–	–	–	–	–	–	–	–	–	16,576 29	
34	15,596 98	23	8,912 80	} 15	2,338 00	–	–	33	803 20	–	2, 26,978 95	63,559 54	
		Guard	7,338 99	}		Aque-					Feed. 1,590 62		
35	5,532 04	24	8,886 88	16	1,066 25	duct	24,340 25	–	–	–	–	39,825 42	
	830,354 99		270,319 66		17,751 49		56,283 70		56,489 51	19,497 24	127,411 14	1,378,107 73	

No. 2.—*Statement of the cost of the works from the mouth of Seneca creek to the "Point of Rocks," so far as the same have been paid or estimated.*

No.	Sections.	No.	Locks.	No.	Lock houses.	No.	Culverts.	Waste weirs.			Done.	To be done.	Total.
36	12,617 83	–	–	–	–	35	664 50	–	–	–	13,282 33		
37	23,086 14	–	–	–	–	37	1,953 75	–	–	–	25,039 89		
38	7,435 68	–	–	–	–	–	–	–	–	–	7,435 68		
39	6,467 94	–	–	–	–	–	–	–	–	–	6,467 94		
40	3,152 89	–	–	–	–	–	–	–	–	–	3,152 89		
41	1,914 46	–	–	–	–	–	–	–	–	–	1,914 46		
42	2,083 22	–	–	–	–	–	–	–	–	–	2,083 22		
43	3,784 92	–	–	–	–	38	2,261 93	–	–	–	6,046 85		
44	3,706 69	–	–	–	–	–	–	–	–	–	3,706 69		
45	7,033 66	–	–	–	–	–	–	–	–	–	7,033 66		
46	3,006 26	–	–	–	–	39	1,283 65	–	–	–	4,294 91		
47	2,168 24	–	–	–	–	–	–	–	–	–	2,168 24		
48	3,904 85	–	–	–	–	41	879 38	–	–	–	4,784 23		
49	3,498 04	–	–	–	–	42	2,178 50	–	–	–	5,676 54		
50	5,668 06	–	–	–	–	–	–	–	–	–	5,668 06		
51	2,483 20	25	11,191 64	17	903 00	–	868 54	–	–	–	15,446 38		
52	2,766 49	–	–	–	–	–	–	–	–	–	2,706 49		
53	4,616 87	–	–	–	–	44½	6,522 82	is a viaduct of	two arches.	–	11,139 69		
54	4,284 72	–	–	–	–	45	1,265 10	–	–	–	5,549 82		
55	2,781 40	–	–	–	–	46	663 75	–	–	–	3,445 15		
56	1,860 80	–	–	–	–	–	–	–	–	–	1,860 80		
57	8,051 70	–	–	–	47 is a viaduct.	46½ & 47	4,809 65	–	–	–	12,861 35		
58	6,634 47	–	–	–	–	47½							
59	5,254 57	–	–	–	–	48 & 49	1,261 56	–	–	–	7,896 03		
60	3,190 43	–	–	–	52½ is a viaduct.	50 & 51	4,151 85	–	–	–	9,406 42		
						52 & 52½	4,286 61	–	–	–	7,477 04		
61	2,979 59	–	–	–	–	53	1,012 62	–	–	–	3,992 21		
62	4,411 48	–	–	–	–	54	1,196 37	–	–	–	5,607 85		
63	10,795 79	–	–	–	–	56	1,232 28	–	–	–	12,028 07		
64	27,623 60	–	–	–	–	–	–	–	–	–	27,623 60		

65	3,098 74	–	–	–	–	–	–	–	–	–	–	3,098 74
66	28,366 32	–	–	–	–	60	874 42	–	–	–	–	29,240 74
67	3,501 70	–	–	–	–	63	1,325 00	–	–	–	–	4,826 70
68	4,719 25	26	10,376 30	18	849 00	64 & 65	5,243 66	1,045 61	a viaduct.	–	–	22,233 82
69	3,179 06	–	–	–	–	–	–	–	–	–	–	3,179 06
70	3,375 07	–	–	–	–	66	1,470 50	–	–	–	–	4,845 57
71	19,308 44	–	–	–	–	–	–	–	–	–	–	19,308 44
72	5,632 41	27	11,323 75	19	893 25	68	1,383 30	–	–	–	–	19,232 71
73	16,091 47	–	–	–	69 is a viaduct.	69 & 70	9,228 98	Aqueduct 2	128,859 23	–	–	154,179 68
74	6,035 25	–	–	–	–	–	–	–	–	–	–	6,035 25
75	2,027 68	–	–	–	–	–	–	–	–	–	–	2,027 68
76	5,780 36	–	–	–	–	71	4,173 26	a viaduct.	–	–	–	9,953 62
77	1,893 75	–	–	–	–	–	–	–	–	–	–	1,893 75
78	2,733 15	–	–	–	–	–	–	–	Tusca. feeder.	3,151 69	–	5,884 84
79	2,527 23	–	–	–	–	–	–	–	–	–	–	2,527 23
80	3,748 37	–	–	–	–	–	–	–	–	–	–	3,748 37
81	4,685 13	–	–	–	–	–	–	–	–	–	–	4,685 13
82	20,365 18	–	–	–	–	–	–	–	–	–	–	20,365 18
83	2,655 77	–	–	–	–	–	–	–	–	–	–	2,655 77
84	5,183 72	–	–	–	72 is a viaduct.	72 & 73 74	5,149 69	–	–	–	–	10,333 41
	322,172 04		32,891 69		2,645 25		65,346 67	1,045 61	128,859 23	3,151 69	556,112 18	

March 1, 1834.

No. 3.—*Statement of the cost of the works from the "Point of Rocks" to the head of Harper's Ferry falls, so far as the same have been paid or estimated.*

Sections.		Locks.		Lock houses.		Culverts.		Waste weirs.	Bridges.	Aqueducts.		Work done and paid for.	To be done.	Total cost.
No.	Cost.	No.	Cost.	No.	Cost.	No.	Cost.	Cost.	Cost.	No.	Cost.			
85	27,599 66	–	–	–	–	–	–	–	3,785 04	–	–	31,584 70	15 00	31,599 70
86	15,386 16	–	–	–	–	–	–	–	–	–	–	15,386 16	–	15,386 16
87	4,995 03	28	9,734 55	–	–	75	1,803 70	350 00	–	–	–	16,883 28	860 00	17,243 28
88	15,258 55	–	–	–	–	76	1,072 20	–	–	–	–	16,330 75	–	16,330 75
89	23,704 56	–	–	–	–	–	–	–	–	–	–	23,704 56	50 00	23,754 56
90	7,404 11	29	9,457 05	–	79 is a viaduct	78 79	5,231 50	350 00	–	–	–	22,442 66	2,110 00	24,552 66
91	6,046 77	–	–	–	–	–	–	–	–	3	33,325 92	39,372 69	–	39,372 69
92	6,886 33	–	–	–	–	–	–	–	–	–	–	6,886 33	–	6,886 33
93	5,438 95	–	–	–	road to culvert 82 is a viaduct	81 82	772 10 4,850 53	–	–	–	–	11,061 58	–	11,061 58
94	4,859 48	–	–	–	–	83	1,043 95	–	–	–	–	5,903 43	–	5,903 43
95	5,840 46	–	–	–	–	84	2,849 40	a viaduct	–	–	–	8,689 86	–	8,689 86
96	3,733 79	–	–	–	–	85	1,266 40	–	–	–	–	5,000 19	–	5,000 19
97	3,294 64	–	–	–	–	86 87	3,805 31	–	–	–	–	7,099 95	–	7,099 95
98	3,849 76	30 Flume	11,694 51 1,134 10	–	–	–	–	350 00	–	–	–	17,028 37	1,150 00	18,178 37
99	3,922 86	–	–	–	–	88	1,688 60	–	–	–	–	5,611 46	–	5,611 46
100	3,706 73	–	–	–	–	89	1,123 80	–	–	–	–	4,830 53	–	4,830 53
101	3,381 88	–	–	–	–	–	–	–	–	–	–	3,381 88	–	3,381 88
102	3,666 66	–	–	–	91 is a viaduct	90 91	5,268 76	–	–	H. F. & F. turnpike	715 37	9,650 79	400 00	10,050 79
103	5,151 90	–	–	–	–	92	1,751 10	–	–	–	–	6,903 00	–	6,903 00
104	4,521 61	31	16,085 49	–	1,031 40	–	–	350 00	–	Road	1,025 50	23,014 00	990 00	24,004 00
105	3,478 56	–	–	–	–	93	3,510 40	–	–	–	–	6,988 96	–	6,988 96
106	23,114 79	–	–	–	–	–	–	–	–	Do	2,180 00	25,294 79	–	25,294 79
107	11,623 79	–	–	–	–	94	1,432 65	–	–	–	–	13,056 44	–	13,056 44
108	29,645 48	32 Flume	11,298 85 1,170 20	–	226 66	–	–	–	–	–	–	42,341 19	–	42,341 19

109	*55,638 55	33	20,728 05	–	–	–	–	–	–	194 40	–	–	89,254 00	1,672 35	90,926 35
	Shen	andoah	12,544 00						dam	149 00					
110	27,538 01	–	–	–	–	–	–	–	–	20 00	–	–	27,558 01	–	27,558 01
111	20,890 51	34	10,282 66	–	–	–	–	–	–	–	–	–	32,305 17	950 00	33,255 17
		Floom	1,132 00												
		35	9,448 00		70 42	–	–	–	–	–	–	–	57,488 99	5,426 55	62,915 54
112	32,905 12	Guard	7,120 75	–	–	–	–	–	–	–	–	–			
		36	7,944 70		–	–	–	–	–	–	–	–			
	363,484 70		129,774 19		1,328 48		37,470 40	1,400 00	4,199 44		33,325 92		575,053 72	13,123 90	588,177 62

March 1, 1834.

* In this sum, and in the cost of section 108, and of lock 33, is included the sum of 22,828 41 dollars, for extra work, which has been reimbursed by the compromise with the Baltimore and Ohio Railroad Company, and constitutes so much of the 100,000 dollars, at which the graduation of 4 1-10 miles of that road is computed, exclusive of contingencies chargeable upon its construction, and included in the general account of the canal disbursements for officers and engineers' salaries.

No. 4.—Statement of the cost of the works from the head of Harper's Ferry falls to dam No. 4, so far as the same have been paid or estimated.

No.	Sections.	Locks.		Culverts.		Miscellaneous.		Done.	To be done.	Total.
113	3,526 50	–	–	–	–	–	–	3,526 50	–	3,526 50
114	11,656 30	–	–	–	–	–	–	11,656 30	–	11,656 30
115	1,943 98	–	–	–	–	–	–	1,943 98	–	1,943 98
116	2,829 46	–	–	95	1,113 60	–	–	3,943 06	–	3,943 06
117	3,793 56	–	–	96 97	2,312 48	–	–	6,106 04	–	6,106 04
118	9,089 50	–	–	–	–	–	–	9,089 50	–	9,089 50
119	1,906 00	–	–	–	–	–	–	1,906 00	–	1,906 00
120	7,507 60	–	–	–	–	–	–	7,507 60	–	7,507 60
121	8,383 59	–	–	–	–	–	–	8,383 59	–	8,383 59
122	5,575 98	37	11,453 13	100	1,881 55	–	–	18,910 66	1,750 00	20,660 66
123	12,814 73	–	–	–	–	Road	1,502 50	14,317 23	–	14,317 23
124	5,028 36	–	–	101 Viaduct	3,297 05	–	–	8,325 41	250 00	8,575 41
125	5,611 42	–	–	–	–	–	–	5,611 42	–	5,611 42
126	2,694 00	–	–	–	–	Aqueduct	23,662 50	26,356 50	1,285 40	27,641 90
127	2,573 47	–	–	102	924 35	–	–	3,497 82	517 20	4,015 02
128	1,976 22	–	–	103	1,080 80	–	–	3,057 02	–	3,057 02
129	2,604 54	–	–	104	1,420 50	–	–	4,025 04	–	4,025 04
130	3,505 59	–	–	105	1,127 20	–	–	4,632 79	–	4,632 79
131	4,531 80	–	–	–	–	–	–	4,531 80	–	4,531 80
132	5,656 00	–	–	–	–	–	–	5,656 00	2,064 00	7,720 00
133	9,401 21	38	7,725 85	–	–	–	–	25,546 66	11,269 40	36,816 06
		S . L.	8,419 60							
134	37,123 15	–	–	107	955 00	–	–	38,078 15	–	38,078 15
135	9,392 56	39	8,332 40	108	1,404 90	–	–	19,129 86	547 00	19,676 86
136	1,701 38	–	–	109	1,110 80	–	–	2,812 18	–	2,812 18
137	1,965 36	–	–	–	–	–	–	1,965 36	–	1,965 36
138	45,835 97	–	–	–	–	–	–	45,835 97	–	45,835 97
139	44,247 45	–	–	–	–	–	–	44,247 45	2,981 50	47,228 95
140	10,798 51	–	–	111	1,470 00	–	–	12,268 51	–	12,268 51
141	3,218 72	–	–	–	–	–	–	3,218 72	191 16	3,409 88

142	1,846 86	–	–	–	–	–	–	1,846 86	–	1,846 86
143	2,124 00	–	–	112	186 00	–	–	2,310 00	198 00	2,508 00
144	2,794 14	–	–	–	–	–	–	2,794 14	–	2,794 14
145	4,465 00	–	–	–	–	–	–	4,465 00	–	4,465 00
146	3,915 43	40	8,92 0 00	–	–	–	–	12,835 43	3,902 00	16,737 43
147	12,039 25	–	–	114	707 75	–	–	12,747 00	–	12,747 00
148	8,484 68	–	–	115	1,205 00	–	–	9,689 68	–	9,689 68
149	3,102 91	–	–	–	–	–	–	3,102 91	–	3,102 91
150	4,438 40	–	–	116	2,538 00	–	–	6,976 40	761 90	7,738 30
151	3,882 75	–	–	–	–	–	–	3,882 75	–	3,882 75
152	3,391 50	–	–	–	–	–	–	3,391 50	799 10	4,190 60
153	13,789 50	–	–	–	–	–	–	13,789 50	390 00	14,179 50
154	25,834 00	–	–	117	56 00	–	–	25,890 00	1,622 50	27,512 50
155	22,615 26	–	–	118	1,808 50	–	–	24,423 76	–	24,257 76
156	8,379 11	Guard	8,520 15	–	–	Dam	47,247 20	64,146 46	874 10	65,020 56
	$387,995 70		$53,371 13		24,599 48		72,412 20	$538,378 51	$29,403 26*	$567,781 77

* The work to be done on this division was reduced in March to – – $22,280 17.

April 11, 1834.

No. 5.—Statement of the cost of the works from dam No. 4 to the extremity of the line, so far as the same have been paid or estimated.

Sections.		Locks.		Culverts.		Aqueducts.		Dams.	Bridges.	Waste weirs.	Done.	To be done.	Total.
No.													
157	16,819 27	–	–	–	–	–	–	–	–	–	16,819 27	728 75	17,548 02
Tow path to													
166	9,165 83	–	–	–	–	–	–	–	–	–	9,165 83	23,780 17	32,946 00
166	1,024 76	41	7,531 35	–	–	–	–	–	–	–	8,556 11	15,534 09	24,090 20
167	4,539 39	42	5,973 17	–	–	–	–	–	–	–	10,512 56	–	10,512 56
168	404 20	–	–	–	–	–	–	–	–	–	404 20	4,308 65	4,712 85
169	1,626 44	–	–	–	–	–	–	–	–	–	1,626 44	3,684 41	5,310 85
170	6,283 41	–	–	–	–	–	–	–	–	–	6,283 41	10,011 25	16,294 66
171	4,576 82	–	–	–	–	–	–	–	–	–	4,576 82	14,619 88	19,196 70
172	6,431 84	–	–	–	–	–	–	–	–	–	6,431 84	37,654 72	44,086 56
173	2,380 80	43	8,895 60	120	1,741 17	–	–	–	–	–	13,017 57	459 14	13,476 71
174	2,463 35	–	–	121	164 03	–	–	–	–	–	2,627 38	660 58	3,287 96
175	2,472 10	–	–	–	–	–	–	–	–	–	2,472 10	1,121 45	3,593 55
176	2,731 02	–	–	–	–	–	–	–	2,242 25	–	4,973 27	–	4,973 27
177	2,769 14	–	–	–	–	–	–	–	–	–	2,769 14	121 00	2,890 14
178	6,914 32	–	–	122	962 00	–	–	–	–	–	7,876 32	40 00	7,916 32
179	4,711 44	–	–	123	1,449 84	–	–	–	–	–	6,161 28	408 00	6,569 28
180	2,531 85	–	–	124	1,510 96	–	–	–	–	–	4,042 81	401 56	4,444 37
181	4,832 90	–	–	125 126 A	2,647 98	–	–	–	–	–	7,480 88	543 86	8,024 74
182	2,403 50	–	–	–	–	–	–	–	–	–	2,403 50	1,226 00	3,629 50
183	1,730 00	–	–	–	–	–	–	–	–	–	1,730 00	119 00	1,849 00
184	3,875 78	–	–	127	684 60	–	–	–	–	–	4,560 38	–	4,560 38
185	11,862 60	–	–	–	–	–	–	–	–	–	11,862 60	1,642 10	13,504 70
186	4,006 12	–	–	128	745 60	–	–	–	–	–	4,751 72	40 00	4,791 72
187	4,754 22	44	10,738 62	–	–	–	–	–	3,221 56	–	18,714 40	237 78	18,952 18
188	1,388 28	–	–	–	–	5	37,520 15	–	–	77 50	40,685 93	7,214 80	47,900 73
					Wing	walls	1,700 00						
189	2,076 07	–	–	129	1,816 88	–	–	–	–	–	4,892 95	1,362 42	6,255 37
190	3,733 50	–	–	131	1,055 50	–	–	–	–	–	4,789 00	–	4,789 00
191	1,872 97	–	–	133	1,263 20	–	–	–	–	–	3,136 17	447 15	3,583 32

192	3,521 99	–	–	–	–	–	–	–	–	–	–	3,521 99	856 20	4,378 19
193	25,151 95	–	–	–	–	–	–	–	–	–	–	25,151 95	3,909 60	29,061 55
194	36,194 34	–	–	134 135	2,969 36	–	–	–	–	–	–	39,163 70	4,573 90	43,737 60
195	19,852 20	–	–	–	–	–	–	–	–	–	–	19,852 20	9,629 10	29,481 30
196	2,106 41	–	–	–	–	–	–	–	–	–	–	2,106 41	1,771 00	3,877 41
197	3,326 79	–	–	–	–	–	–	–	–	–	–	3,326 79	–	3,326 79
198	2,985 08	–	–	–	–	–	–	–	–	–	–	2,985 08	–	2,985 08
199	6,783 50	–	–	–	–	–	–	–	–	–	–	6,783 50	1,469 00	8,252 50
200	4,685 29	–	–	–	–	–	–	–	–	–	–	4,685 29	2,780 00	7,465 29
201	6,076 18	–	–	136	3,155 60	–	–	–	–	–	–	9,231 78	3,834 00	13,065 78
202	16,805 90	45	5,659 55	–	–	–	–	26,511 60	–	–	–	–	26,944 40	88,090 95
		Guard	5,704 00	–	–	–	–	–	–	–	–	58,203 55	398 00	
		River	3,522 50	–	–	–	–	–	–	–	–	–	2,545 00	
	248,871 55		48,074 29		20,166 72		39,220 15	26,511 60	5,463 81		77 50	388,336 12	*185,076 96	573,413 08

* The work to be done on this division of the canal was reduced in March, 1834, to $156,297 65.

RECAPITULATION.

	Sections.	Locks.	Houses.	Bridges and aqueducts.	Culverts.	Waste weirs.	Dams.	Done.	To be done.	Total.
1	830,354 99	270,319 66	17,751 49	56,283 70	56,489 51	19,497 24	127,411 14	1,378,107 73	–	1,378,107 73
2	322,172 04	32,891 69	2,645 25	128,859 23	65,346 67	1,045 61	Feeder 3,151 69	556,112 18	–	556,112 18
3	363,484 70	129,774 91	1,328 48	37,525 36	37,470 40	1,400 00	149 00 Roads 3,920 87	575,053 72	13,123 90	588,177 62
4	387,995 70	53,371 13	–	23,662 50	24,599 48	–	47,247 20 Roads 1,502 50	538,378 51	29,403 26	567,781 77
5	248,871 55	48,024 79	–	39,220 15 Bridges 5,463 81	20,166 72	77 50	26,511 60	388,336 12	185,076 96	573,413 08
	2,152,878 98	534,382 18	21,725 22	291,014 75	204,072 78	22,020 35	209,894 00	3,435,988 26	227,604 12	3,663,592 38

NOTE.—The railroad graduation is not included in this statement; the cost of the Frederick turnpike road, of Brien's road, and of the removal of the Frederick county road, as well as of the improvements and repairs, are included, and amount to the sum of . . . 115,930 88

March 1, 1834. Leaving the total cost 3,547,661 50

Certificate furnished by the clerk of the Canal Company on the 11th of April, of the work done and to be done on the 1st of April, 1834, to complete the canal below a point eight miles above Williamsport.

The general statement, already furnished, shows the amount estimated by the engineer to remain *to be done on the 1st of March*, 1834.

The estimates to the 1st April, as compared with that statement, show that there remains *to be done* of the work included in the tables—

No. 4. viz. from section 113 to dam No. 4, inclusive, .		$22,280 17
No. 5. from thence to dam 5, thus—		
On the sections under the letting of August, 1832, ...	$57,006 43	
On the seven sections 166 to 172, inclusive, let in May, 1833, ...	75,511 05	
On the towpath, let in May, 1833, . .	23,780 17	
		156,297 65
Total amount of work to be done subsequently to the 1st April, 1834, ...		178,577 82

F.

Until an intelligent Scotchman discovered on the canal leading from Glasgow to Paisley, that the rule laid down by Dubuat and other mathematicians was incorrect, "that the resistance encountered by any body, in moving through water, was as the square of its velocity, and that this resistance was augmented in the motion of boats on confined surfaces, as on canals, in proportion to the reduction of their breadth and depth, or their cross sections," this law of motion, founded upon mathematical demonstration, and numerous experiments in France, between the years 1780 and 1783, was admitted without question.

It is still true, of any velocity on canals, under six miles an hour; and it consequently applies with undiminished force, and will probably ever so apply, to the motion of heavy freight boats; the cost of accelerating which, could not be defrayed, in most cases, by the value of their cargo, or the saving of a few hours or days' interest on that value, by quickening their arrival at market. Prior to fixing definitively, as was ultimately done, with the sanction of the stockholders, the enlarged dimensions adopted for the Chesapeake and Ohio canal, the President and Directors looked to every source within their reach for information. They were apprised of the singular fact, that, on the Schuylkill line of navigation, made up of a succession of canals and ponds of slack water, when no freshet had swelled the river, the trackage of a canal boat was easier against its broader, though gentle current, than on the confined canal. But the following passage in the able report of the United States Board of Internal Improvement, and the letter subjoined to it in several public documents, as well as in the first annual report of the Canal Board, conclusively settled, in the judgment of the Board and of the stockholders, the expediency of those enlarged dimensions adopted by the former, and approved by the unanimous assent of the latter.

" Plan and estimate of the canal.

"The transverse section of the canal is exhibited on the sheet No. 3. The breadth at the bottom is 33 feet; at the surface, 48 feet; the depth of water, 5 feet; the towpath, 9 feet wide; the guard banks, 5 feet at the top; the surf berms, kept on the level of water, 2 feet wide each; the towpath, and top of the guard bank, 2 feet above the surface of the canal.

"This transverse section is to be modified where local circumstances require it; and, more especially, in the cases of deep cutting, steep side cutting, embanking, and, also, where the canal is supported by walls. In the framing of the plan, a due attention has been paid to these modifications, with a view to conciliate the convenience of the work with the strictest economy. The depth of 5 feet has been preserved throughout the line, but the breadth has been often much lessened. As to the surf berms, they are intended to protect the slopes from being washed off, as also to lessen the resistance opposed to the boat, by affording to the eddy water a free passage.

"We must submit, however, the reasons which led us to propose the above dimensions.

"The experiments made in 1775, by the French academicians (D'Alembert, Cordorcet, and Bossut,) have shown, 1. That the resistance of water to the perpendicular motion of a given plane, may be regarded as proportional to the square of the velocity. 2. That the velocity being the same, the resistance of water may be considered as proportional to the area of the plane. 3. That these results obtained only in the case of an indefinite expanse of water. 4. That, in narrow canals, the resistance increases in a more rapid ratio than the square of the velocity.

"To attenuate, as much as practicable, this inconvenience, researches have been made to ascertain what should be the ratio between the transverse section of the canal and the transverse section of the boat, in order that the boat might move through such a canal, as through an indefinite expanse of water. Experiments made on the subject by the celebrated Chevalier Dubuat, have shown that, to attain this result, the cross section of the canal ought to be, with moderate velocities, 6.46 times the cross section of the boat, and the water line $4\frac{1}{2}$ times the breadth of the boat.

"Adopting, to preserve uniformity, $13\frac{1}{2}$ feet for the breadth of the boats used on the Chesapeake and Ohio canal, [which is the breadth of the Erie canal and of the Ohio canal boats,] if we suppose the draught to be three feet, the prow to be rectangular, and the sides and bottom of the boat to conform to it, the cross section of the boat will be 40.5 square feet. Taking, now, this area 6.46 times, we find $261\frac{2}{3}$ square feet for the cross section of the canal, through which the boat would not meet with a greater resistance than through an indefinite expanse of water. The water line should be $60\frac{3}{4}$ feet, that is, four times and a half the breadth of the boat.

"Were not expense to be taken into consideration, these dimensions might be recommended; but fitness of the work, and strict economy, must be reconciled as much as practicable, and it is in such a view that smaller dimensions are to be fixed upon.

"It is to be remarked, that the distance from Georgetown to Pittsburg,

in following the line of canal, is 341¾ miles, which, at the rate of 2½ miles per hour, will be travelled in about - - - 136 hours.
The ascent and descent, amounting together to 3,158 feet, will require, at the rate of 1 minute per foot, about - 52

Distance, in time, from Georgetown to Pittsburg, - - 188 hours.

"Though a number of canals, selected among those executed to this day, might afford together the distance and lockage found for the Chesapeake and Ohio canal, yet there is not, within our knowledge, any line of the same extent requiring even 1,800 feet of ascent and descent taken together: the Erie canal requires 688 feet for 362 miles; the line from Liverpool to London, 1,451¼ feet for 264 miles; the canal from the Rhone to the Rhine, connecting Lyons with Strasbourg, has about 1,458 feet of lockage for a length of 200 miles. The proposed canal has, therefore, as to time, a decided inferiority, when compared to a canal of the same length, but having a less amount of lockage; and it becomes, in the present case, indispensable to remedy this inconvenience. The means we propose consists in the increase of the dimensions of the cross section of the canal, with a view to compensate, by a greater weight, [transported without additional power,] for the virtual increase of distance caused by so great an amount of lockage.

"We have shown that this section ought to be 261 square feet, with a water line of 60 feet, to procure a boat 13 feet 6 inches in breadth, the advantage of moving on the canal, as on an indefinite extent of water. After many trials and minute calculations, we have concluded to adopt, for the contemplated canal, the 4-5 of the foregoing results, viz. for the cross section, 208 square feet, and for the water line, 48 feet; and from these data, we have framed, with a depth of 5 feet, the general transverse profile of the canal, as exhibited on the sheet No. 8.

"Let us now compare this profile to one having 40 feet at the surface, 28 feet at bottom, and 4 feet in depth—the boat used being the same for both, and having 13½ feet in breadth, and 3 feet draught.

"We find, by calculations, that, the velocity remaining the same, the resistance to the boat moving in the 48 feet canal, is to the resistance to the same boat moving in the 40 feet canal, as 1.21 to 1.58, or as 100 to 130. Therefore, at the same rate of velocity, 100 horses will, on the 48 feet canal, perform the same work as 130 horses on the 40 feet canal; and, with the same towing power, the weight transported on the 48 feet canal, will be to the weight transported on the 40 feet canal, as 130 to 100.

"But the depth of the 48 feet canal being one foot greater than the depth of the other, let us examine what will be the comparative resistance of the boat being immersed 4 feet into the 48 feet canal, and but 3 feet into the other. We find, in this case, the ratio to be 1.47 to 1.58, or 100 to 107; and we infer from it that, with a gain of about seven per cent. of towing power, the weight transported on the 48 feet canal will be one-third greater than the weight transported, during the same time, on the 40 feet canal.

"The foregoing considerations show that, in determining the transverse section of a canal of great length, and with a dividing summit level, the amount of lockage must have a due influence upon the breadth and depth of the water section. And, indeed, taking into view the great distance and considerable lockage belonging to the present case, a cross section, larger than that recommended, might have been suggested, had not a re-

gard to economy, and to a competent supply of water during the dry season, forbidden it.

"However, the transverse section, as just proposed, may be deemed sufficient to fulfil, in a satisfactory manner, the main requisite for which it has been intended. And, in order to remove all doubt, let us compare, as to amount of transportation, the contemplated Chesapeake and Ohio canal, with another of the same length, but whose lockage would be 600 feet only, with a transverse section of 40 feet at the surface, and four feet in depth.

"The rate of travelling being supposed, for both, $2\frac{1}{2}$ miles per hour, and one minute allowed for each foot of lockage, 60 feet will be, as to time, equivalent to $2\frac{1}{2}$ miles, and these canals will then compare as follows:

"The Chesapeake and Ohio canal, having 3,158 feet of lockage, in a distance of $341\frac{3}{4}$ miles, is equivalent, as to time, to a single level canal of 473 miles, which would require 189 hours to be travelled from one end to the other.

"The 40 feet canal, having 600 feet of lockage in a distance of $341\frac{3}{4}$ miles, is equivalent, as to time, to a single level canal of 367 miles, and which would be travelled in 146 hours, from one end to the other. But it has been shown that, on the first canal, the amount of transportation being expressed by 130, it will be 100 on the 40 feet canal—the velocity and towing power remaining the same in both cases. Comparing, now, this ratio of 130 to 100, with that of the times employed to travel, respectively, each canal, viz. 189 hours to 146, it is found that these ratios are equal. Therefore, on either of these canals, and notwithstanding a difference of 2,558 feet lockage, an equal weight will be transported during the same time, and with an equal towing power—a result entirely due to a larger transverse section having been assigned to the canal, whose lockage is greater."*

* "After the enlarged dimensions of 60 feet by 6 feet, for the volume of water in the canal, were recommended to the Committee of the House of Representatives on Roads and Canals, by the chairman, he addressed a letter of inquiry to General Bernard, on the comparative resistance of the motion of a boat of given structure and burden, on such a canal, and on one of the dimensions recommended by the Board over which that officer presided. The annexed letter contains his answer to this inquiry:

"*Letter from Gen. Bernard to the Hon. C. F. Mercer.*

"WASHINGTON CITY, *February* 17, 1827.

"SIR: I have the honor to forward to you the result of the calculation you asked for in relation to a canal 60 feet wide at the water line, 45 at the bottom, and 5 feet deep.

"The cross section of the boat remaining as assumed in the report on the Chesapeake and Ohio canal, such a boat would, for the reason set forth in this report, move, at moderate velocities, on a 60 feet canal, as on an indefinite extent of water.

"The resistance proved, in this case, by the boat being expressed by 1, the number 1.21 will represent the relative resistance in a 48 feet canal, and 1.58 that in a 40 feet canal. Thus, with a towing power of 100 horses, the same work will be performed on the 60 feet canal, as with 121 horses on the 48 feet canal, and 158 on the 40 feet canal: these two latter canals being here supposed to retain the respective cross sections assigned to them in the aforesaid report.

"Now, assigning to these two canals the same comparative length and amount of lockage as alluded to in the report, they become on the same footing as to towing power. But the 60 feet canal has the same length and amount of lockage as the 48 feet canal: therefore, it will have an advantage of 21, or 18 per cent. over the latter as to towing power, and the same advantage over the 40 feet canal. In other words, 18 per cent. more weight would be transported, during the same time, and with the same towing power, on the 60 feet canal than on the two others.

"I have the honor to be, sir, very respectfully, your obedient servant,

"BERNARD, *Brig. Gen.*

"To the Hon. C. F. MERCER, M. C. *Washington City.*"

The estimated resistance contemplated in General Bernard's letter supposed the Chesapeake and Ohio canal to be five feet deep only. Such was then its contemplated depth throughout. In a recent letter of Dr. William Howard, an associate civil engineer of the former Board, the foot added to the depth of the canal is admitted as an element of a similar comparison; and the difference before reported to be less than sixty is made seventy-one per cent. in favor of the enlarged canal, the moving vessel upon its surface being supposed to be about ninety-four feet long and fourteen and a half wide, laden with a hundred tons, and drawing three feet eight inches of water, at the velocity of two and a half, or three miles the hour.

WASHINGTON CITY,

May 2, 1834.

SIR: I have the honor to acknowledge the receipt of your letter, making the inquiry as to what would be, according to the formula of Dubuat, the relative resistance to a boat of a certain size, drawn through canals of different dimensions.

Agreeably to your request, I assume the boat to be 14 feet 6 inches broad, its draught of water when carrying 100 tons, to be 3 feet 8 inches, and its length about 94 feet. Its cross section then, making a small deduction for the slight curvature of the bottom, would be 52 square feet.

The comparative resistance to this boat, moving at the ordinary rate of burden boats, would be as follows: Let us take three canals.

(A.) A canal 40 feet broad at surface, 28 at bottom, and 4 feet deep, whose cross section would therefore present an area of 136 square feet.

(B.) A canal 50 feet wide at surface, 32 at bottom, and 6 feet deep, cross section 246 square feet.

(C.) A canal 60 feet wide at surface, 42 at bottom, and 6 feet deep, cross section 306 square feet.

The resistance to the boat, when moving on A, would be to the resistance when moving on B, as 146 to 100.

The resistance to the boat moving on A, would be to the resistance on C as 171 to 100.

The resistance on B would be to that on C as 117 to 100.

You will observe some apparent discrepancy among the results of the calculations made by different persons, at different times. This has arisen from a difference in the assumption of some of the principal elements of the formula, such as the cross section of the boat, or that of the canal, where these have not been precisely stated.

I have the honor to be, sir,

Your most obedient servant,

WM. HOWARD.

Hon. C. F. MERCER.

In corroboration of the preceding positions, the actual use of the Chesapeake and Ohio canal for three years, between the head of Seneca falls and Georgetown, has demonstrated that a single horse, of ordinary strength, can, with facility, track upon it fifty-two tons, inclusive of the weight of the boat. A member of the House of Representatives, and former Speaker of the House of Delegates of Maryland, informed the chairman of the committee that he had yielded his former preference of railways, to canals, to

the evidence of the superiority of the latter, afforded by his seeing a small horse less than fifteen hands in height, arrive at Georgetown before sunset with a load of five hundred and twenty barrels of flour, with which he had left Seneca in the morning of the same day, having passed through twenty-two miles of canal, and more than twenty locks.

G.

Doctor John Martineau, the civil engineer, by whose indefatigable industry, in a season of general sickness on the Potomac, the working location and estimates were prepared for the 48 miles of the Chesapeake and Ohio canal, next below the Point of Rocks, computed the cost of extending the depth of the entire line of the eastern section from 5 to 6 feet, at more than $400,000. Mr. Thomas G. Kennedy, assistant engineer, and the superintendent of the Delaware division of the Pennsylvania canals, in his report to the Canal Commissioners of that State, in November, 1827, states that "the estimate of Mr. Henry G. Sergeant," to whose skill that work was indebted for its location and estimate, computed the cost of deepening it from 4 to 5 feet, at 16 cents the cubic yard, for the excavation of the additional foot of common earth, being on the plan of that canal, which is but 40 feet at the surface, about 750 dollars the mile. The average cost of the common excavation he computes, in the same estimate, at but $8\frac{11}{12}$ cents the cubic yard, but little more than a moiety of what he allows for the last foot in depth.

The extension of this depth to 6 feet, would have obviously warranted or required a still higher estimate per cubic yard, for the excavation of the lowest foot, which is not only to be carried up through the other 5 feet, but will usually be found to consist of harder materials than the superincumbent earth.

The spaces in which the canal will cost as little, with enlarged as with contracted dimensions, will not be found to exceed in length one-tenth of the eastern section of the Chesapeake and Ohio canal. But the portion of the canal, which admits of the dimensions of 60 feet breadth, and 6 feet depth of water, without adding more than fifteen or twenty per cent. to its cost, exceeds two thirds of its extent. Every contraction of its dimensions operates on a canal as a hill or sudden elevation on an ordinary road, or an increased ascent on a turnpike, or a railway; and the power which cannot overcome such a resistance, is rendered incompetent for general use; although on every other part of the line of improved navigation, or road to be travelled, it may experience no difficulty whatever in drawing the boat or the carriage. Hence, the importance of preserving, throughout, those dimensions which assure to a canal the full benefit of its enlargement.

If the intervals of contraction be very short, and the motion very slow, then, indeed, from the peculiar character of the resistance encountered, by the moving power, on a canal, that power, with a much retarded velocity, may prove adequate throughout; because the water which accumulates in front of the boat, will flow as it is pressed forward, through the contracted passages of the canal, and spread, after having escaped, over the enlarged surfaces beyond them, as is the case, always, in passing an aqueduct. For this reason, an enlargement of a canal should always be made, both at the

entrance and departure from every such contracted passage, as is the case, generally, on this canal. In all other instances, of its reduction in breadth, which do not comprehend three miles in the entire line of 62 miles, below Harper's Ferry, the future value of the rock, which confines the way at all such contractions, will render it as cheap, as it will be easy, to remove it for buildings and fences: so that, except at the aqueducts and locks, no part of this canal will be reduced in breadth, below those dimensions which are best calculated to facilitate and cheapen the cost of its navigation.

I.

The cost of excavating common earth was, by the first contracts, often reduced as low as 7 cents the cubic yard. The 450,263 cubic yards, which had been excavated in June, 1829, averaged in cost $8\frac{53}{100}$ cents; 14,437 cubic yards of quarried rock, $28\frac{30}{100}$ cents; 43,930 of blasted rock, 53 cents a cubic yard; 39,378 cubic yards of embankment of earth, from the canal excavation, averaged $10\frac{76}{100}$; and 52,352 of earth not supplied by the canal excavation, $12\frac{93}{100}$ cents.

In the last contracts made by the Canal Board, the average allowance for earth excavation is 11 cents; for blasted rock 60 cents; the embankment has been found to average 17 cents, though its value is left in each case to the judgment of the engineer.

In the early contracts of the company, a further subdivision of the subjects to be estimated, was admitted into the written contracts at distinct prices, with a view to diminish the discretion of the engineer, and to limit, with greater precision, the cost of the work. Hard pan was comprehended among the subjects, to the excavation of which, a distinct price was attached; quarried was distinguished from blasted rock; and the embankment graduated in price by reference to the various distances through which the earth that formed it might of necessity be transported. Much, even here, was left to the discretion of the engineer, the umpire created by the contracts, to decide all disputes between the contractors and the company. It was found, on experience, expedient to make the contracts consist of fewer items, and to impose on the contractors the necessity of carefully examining the ground, over which the canal was to be constructed, before they submitted their proposals. Hard pan is totally excluded from the estimates of the present work, as it has been, by nature, almost entirely from this canal, not a thousand yards having been found in its entire course.

Quarried, is not in the late contracts distinguished from blasted rock, on account of the impossibility of making a just discrimination, and the cost of embankment of earth from without the canal line, depends on such a variety of circumstances, that it has been deemed expedient to leave its value, in each case, to the sound discretion of the engineer charged with the superintendence of the work. In the last contracts, 11 cents per cubic yard has been allowed for every sort of material excavated, except rock; and for that, embracing every variety, 60 cents the cubic yard.

One cause of the higher price of the canal, below Seneca, should not be omitted. There was scarcely one-fourth of a mile of the entire line of $23\frac{1}{2}$ miles, in which large detached stone, of the description called boulders, and ridges or strata of rock, more or less solid, did not occur. Whole

sections, therefore, computed at 8 cents the cubic yard, prior to their construction, cost twelve times that sum for their mere excavation. In the bottom lands this occurred, as well as on the levels of the table land elevated more than sixty feet above the river. In some places the rock at the bottom of the canal, as on the low grounds below Seneca, for two feet of its depth, cost for excavation $1 25 the cubic yard, though the prior estimate of the engineer comprehended no rock whatever—a fact, demonstrating the utility of frequent borings, to the bottom of an intended canal, prior to the acceptance of proposals for its construction, and, indeed, prior to a decision upon its ultimate location, and fixing its levels, and the position of its locks, upon which they depend.

It is deemed expedient to add to this note, the following description furnished the committee, of the rules observed by the President and Directors, in making their contracts. Except about a quarter of a mile at the commencement of the numbered sections, the entire work has hitherto been done by contractors, and experience confirms, beyond question, the expediency of this mode of construction.

The first division extended to Harper's Ferry, and was placed under the direction of Benjamin Wright, of New York, who, while he remained in the service of the company, acted as chief engineer. Two other engineers of division were attached to the line of 126 miles above Harper's Ferry, which, for construction, was distributed into two divisions, having an engineer allotted to each. The engineers of division formed, when required, a board, to whose judgment the President and Directors referred all questions of difficulty or doubt.

Each division of the canal was designed to be, and so much of the first division, below the Point of Rocks, as was left open to construction in the first three years and a half of the five and a half that the company had been organized, prior to January last, was subdivided into five residencies of various lengths, corresponding with the relative difficulty of their construction; and to each residency, were allotted, one *resident* engineer, one assistant, and a rodman. Their accountability to the engineer in chief, in the first instance, to the President of the company, and the President and Directors, was established and defined by printed rules for their government, early adopted by the Board, who retained the power of appointing the engineers of division, but gave to the President, solely, the power of appointing and removing the resident engineers and their subordinate assistants.

Under the direction of the corps of engineers, according to instructions from the Board, through the President of the company, the line of canal designed to be constructed, was accurately laid down, and distributed as nearly as practicable, having reference to the quality of the work, into sections of half a mile each, which were carefully marked on the ground. A report of the probable cost of each section was prepared by the engineers at the time of making the final location, which sets forth the sum proper to be allowed for grubbing the section, the number of cubic yards of excavation of earth or rock in the section, so far as repeated borings and the most careful examination may disclose the quantity and quality of both, and the proper cost to be allowed for the excavation of each; the number of cubic yards, also, of embankment, and its value, no earth entering into the embankment being computed or paid for as such, which is not necessarily transported more than 120 feet from the place of excavation; the number

of perches of stone walling, for the protection of the exterior surface of the embankment, from abrasure, where exposed to the action of the river, and the proper allowance per perch therefor, noting whether the stone, for such wall, be likely to be found in excavating the canal, or must be transported from a distance; and in the latter case, such distance, and the sum proper to be allowed for the transportation.

These estimates are extended in dollars and cents, and for each section the aggregate amount is given. Of all these estimates the clerk of the company prepares a ruled copy, leaving spaces opposite to the estimates of the engineers, for entering the bids or proposals of the various persons desirous of contracting for the construction of the section, which comprehend the details of the prices at which they are willing to execute the proposed work.

After the canal is actually laid down on the ground, and some time before the receipt of the proposals for its construction, a description of the work to be done is advertised for a sufficient time, and so extensively, as to give notice to every part of the United States, of the work to be placed under contract, of the time when proposals will be received for its construction, and when the contracts will be executed, in conformity with such as are accepted. Printed forms of such proposals are supplied to all persons who ask for them, by the clerk of the company, at the office in Washington.

Prior to the arrival of the day for deciding on them, the clerk of the company transcribes into the book of estimates, the offers of the various bidders, noting their respective prices for the various species of work; and extending the aggregate amount of each offer or bid, according to the quantity of each species of work previously ascertained to be necessary, by the engineers charged with the location and estimates.

On the day on which the various proposals are to be accepted or rejected, the book which has been described, and the recommendations of the various bidders, are laid before the President and Directors, and in their presence, by a majority of their voices, the several proposals are accepted or rejected.

The rules observed in this decision are, to let the work, which has been advertised, to the lowest bidder of fair character; unless he is the bidder, also, at the lowest price, for more work than the Board deem it expedient to place under contract, with one contractor. When the lowest bid embraces more than this quantity, the same work is offered to the next lowest bidder of good character, at the price offered by the former. If *not* taken at this price, or within a small amount of it, which has been *seldom* the case, the first offer is accepted, or some other contractor of good character has the work *tendered to him*, at the price of the lowest proposal for its construction.

In like manner, *mutatis mutandis*, are let the dams, locks, aqueducts, and culverts, and all other works on the canal; preparatory to which, careful examinations are made, for the discovery of proper materials for each work, in the vicinity of the place where it is to be constructed.

The contracts having been formed, and two copies of them subscribed by the parties, the work is prosecuted from time to time, as the engineers, under the orders of the President, or of the President and Directors, may require. As it proceeds, weekly reports are required of each contractor, through the resident engineer and his assistant, who certify their correct-

ness, of the number of men and boys, horses, mules, and oxen, wagons, carts, wheelbarrows, and drills, employed by him, and the pounds of gunpowder consumed in blasting rock, during the preceding week; and the wages of labor actually paid by him.

If this force be deemed insufficient to complete the work, undertaken by the contractor, in the time stipulated in his contract, the resident engineer is empowered, by the contract itself, to direct its augmentation; and if the contractor refuse or neglect to obey such order, on the certificate of the engineer, of such neglect or refusal, the President of the company has power to declare the contract at an end, and to relet the unfinished work, *on the same terms*, to any other person disposed to undertake it. Monthly payments are made to the several contractors, founded on estimates, written and subscribed by the resident engineer and his assistant, of the quantity and value, according to contract, of the work done by each contractor, in the preceding month. From this amount, twenty per cent. is deducted, and the residue paid. The twenty per cent. of the monthly estimates is retained, as an indemnity to the company for any possible breach of the contract; and is withheld by them till the work be completed, according to contract. For the due completion of it, no other security is required.

No suit has, in consequence, ever been instituted against any contractor by the company, for a breach of contract, though many contracts have been declared abandoned. After much experience, the President and Directors adopted, and have since steadily adhered to the rule, never, under any circumstances, to allow additional compensation to any contractor. He is held at liberty, however, to abandon his work, whenever he deems it expedient; provided he leave his retained money with the company.

As the work proceeds, and is partly finished, the number of engineers who inspect it, is reduced, or several residencies are united under the superintendence of one resident engineer; and when entirely completed, it is confided to the daily inspection of a superintendent of repairs, who is himself supervised, and appointed, or removed, as are all the engineers, collectors, and lock-tenders, by the President, the chief executive officer of the company, whose duty it is to execute all the orders of the Board; to see that his own are obeyed; and, supervising the actual construction of the work, as often as practicable, to keep every subordinate agent of the company to his duty; to see that all impediments to the regular progress of the work, and the regular administration of the affairs of the company, are promptly removed, as far as practicable, by his own power; and where that is defective, reporting all such obstructions to the Board of Directors, and obtaining their aid. No money passes through the hands of the President of the company; nor can any money be withdrawn from the banks in which it is deposited, but by order of the President and Directors sitting as a Board. For the financial administration of the affairs of the company, see a subsequent note.

It may here be remarked, however, that this branch of the canal administration has hitherto been conducted without the loss of one dollar to the funds of the company; and that the expenditure of every cent of the millions it has cost, had been faithfully accounted for on the 1st of June, 1833.

K.

In a report, bearing date the 25th of June, 1827, to the Chief Engineer of the United States, "on the survey and estimate of a canal from Georgetown to Baltimore," made at the instance of the State of Maryland, by the civil engineer, by whom the survey was conducted, Dr. William Howard, of Baltimore, whose name is subscribed, as a member of the Board of Internal Improvement, to the prior report and estimate of the plan and cost of the Chesapeake and Ohio canal, it is stated explicitly, that "the execution of the canal, (subsequently called the 'Maryland Canal,') according to the plan thus proposed, '*depends essentially*' upon the supposition of the Chesapeake and Ohio canal being continued from the Little falls of Potomac to Georgetown, at an elevation at least 25 or 30 feet above tide; and affording to this lateral canal, a supply of water sufficient for its consumption, at least as far, as the eastern branch, a distance of five miles. If, on the contrary, the principal canal terminated just below the Little falls, or at some other point above Georgetown, the direct connexion of the Maryland canal with it becomes impracticable."

In a subsequent paragraph, Dr. Howard describes the termination which the Board had recommended for the Chesapeake and Ohio canal, to be "in a basin *in Georgetown, between Bridge and Water streets*," and proposes to begin the Maryland canal "at this basin." (Vide Doc. No. 58 of the H. of R. 1st session of the 20th Congress.)

The act of Congress of May, 1828, authorizing a subscription to the stock of the Chesapeake and Ohio canal, conforming to this view, expressly provides, "that for the supply of water to such other canals as the State of Maryland, or Virginia, or the Congress of the United States, may authorize to be constructed, in connexion with the Chesapeake and Ohio canal, the section of the said canal, leading from the head of the Little falls of the Potomac river," (an elevation known to be $37\frac{1}{2}$ feet above the tide,) "to the proposed basin, next above Georgetown, in the District of Columbia, shall have the elevation, above the tide, of the river, at the head of the said falls; and shall preserve, throughout the whole section aforesaid, a breadth, at the surface of the water, of not less than sixty feet, and a depth, below the same, of not less than five feet, with a suitable breadth at bottom."

The expression "*above* Georgetown," in the act, was admitted in the absence of any exact description of the "proposed basin," in the report of the Board of Internal Improvement, and without recurring to the language of that of Dr. Howard, which conclusively fixed the position of this basin *within* that town, as has been here shown; while the act of Congress evidently contemplated its connexion with the Maryland canal, as the interest of Maryland required.

It had been a favorite project of Mr. Jefferson to extend a canal, from the head of the Little falls of Potomac, to the navy yard, at such an elevation, as should be calculated to supply with water extensive docks, for the construction, preservation, and repair of the armed ships of the United States; and the certainty, that Alexandria would, also, claim, or Virginia, in her behalf, a branch canal, to her harbor, induced the enlargement of the breadth of the canal, from the head of the Little falls, to the point, where the Alexandria branch was expected to cross the Potomac, and the addition of a foot to its ordinary depth; so as to admit of a descent, in a distance of five miles, of a foot, and yet, to allow at all times 6 feet depth of water, as above,

for navigation. The Maryland canal would, if constructed, be, in length 44¾ miles. Its cost was estimated according to the same scale of prices, for its various works, that the Board, of which Mr. Howard was a member, applied to the Chesapeake and Ohio canal. Its total lockage was computed to be 294 feet, and distributed among 38 locks. Its cost, including contingencies, was estimated at $2,980,815 40. Dr. Howard states this estimate to be "*intentionally made high*, in order to ensure that the work may be made, for a sum, within its limits, *more* or *less*, according as contingencies may prove favorable, or unfavorable." The Legislature of Maryland, contemporaneously with the grant of a charter, authorized a subscription of $500,000 towards its construction. Its dimensions were to be the same in all respects with those, which the Board of Internal Improvement had recommended for the Chesapeake and Ohio canal; of which, it would have been, in fact, but a continuation, to the harbor of the third city of the United States.

There can be no doubt, but that its construction could have been effected for two-thirds of the estimate, that, having been founded on the same elementary calculations which led to the very high estimate of the cost of the main stem of the canal.

Had it been accomplished, according to the plan of Dr. Howard, it would have reduced the circuitous and hazardous water communication which now subsists by the Potomac, the Chesapeake bay, and the Patapsco, between Georgetown and Baltimore, from 230 to 45 miles, and have lessened to the same extent, the like communication, between the seat of Government of the United States and the cities of Philadelphia and New York. Aided by the recent completion of the Delaware and Raritan canal, it would have opened a line of inland navigation, for 100 ton vessels, but 260 miles in extent between the ports of the District of Columbia and the three largest cities of the Union.

Its use for purposes of national defence, to say nothing of its commercial advantages, would prove of incalculable value in time of war and of threatened invasion, reducing the expense of national security, by enabling a single army to accomplish the purpose of several, and obtaining, for the defensive forces of the country, a greater celerity of movement, than a hostile fleet could impart to the invader.

It is for this reason that the opinion is hazarded in a subsequent passage of this report, that this highly important extension of the Chesapeake and Ohio canal will yet be accomplished, when the forgotten experience of the last war shall be revived, by a recurrence of all the calamities which attended the defence of the principal cities of the middle States of the Union, by so many independent armies of hastily embodied, and half armed and equipped militia.

The distance between New York and Pittsburg, by this line of improved navigation, after the completion of the Chesapeake and Ohio canal, would not exceed 610 miles, while that, by the Erie canal, Presque Isle, and the Alleghany river, is not less than 750 miles, and subjected, as has been stated, in its present condition, to four transhipments.

A canal, from the Alleghany to the Genesee river, would greatly diminish the length of the water communication by the northern route between Pittsburg and New York, and reduce the number of transhipments, which now impede it, but would leave to the southern route, all the advantages to be derived from the large dimensions of the Chesapeake and Ohio canal, and its milder climate.

L.

The notes of this survey are too long to be admitted, entire, into the appendix of this already protracted report; but the following abstract, from the report, and the estimates accompanying it, will demonstrate the probable correctness of its results.

An order for this survey had been made by the Canal Board, in the preceding month of May, and repeated on the 22d of November last. Mr. Cruger made his report of its execution on the 20th of March. After having completed it, Mr. Cruger says, "the unfinished business appertaining to the construction of the canal at Harper's Ferry and in the district, I collected my assistants, and repaired to Hancock to commence operations. As the preliminary step, I examined the river, from Hancock to the mouth of Cacapon, and selected a proper site for the contemplated dam, a point seven hundred feet below the mouth of Cacapon, which enters the Potomac from the Virginia shore. I was led to this selection by the following considerations. 1. That the order of the Board pointed to the location of a dam below the mouth of the Cacapon. 2. That its natural advantages of a rock bottom, and a considerable fall in the river, indicated the fitness of the site selected. 3. That the water and trade of the Great Cacapon were thus secured to the canal. 4. The distance, twenty-seven and a half miles, to the next feeder or dam, was *supposed* to be as great as could be supplied from one source, consistently with the navigation of the canal, and the extensive sale and use of water power.

"Having thus determined the upper extremity of the first division, above dam No. 5, which will probably constitute the first letting, we descended the river to Clear spring, where we rested until we had completed the location, on both shores of the Potomac, for six miles above dam No. 5. We then proceeded until the whole was finished, on both shores, to the proposed dam. I present the following description of the plan of the canal and its location:

"The canal is intended to have fifty feet surface, and a depth of six feet. The towpath and berm banks, respectively, twelve and eight feet wide, and two feet above water surface in the canal. The locks to be of cut stone, in courses, fifteen feet wide. and one hundred feet between the gates. The culverts of rubble masonry, with cut ringstones, and one hundred feet long. The aqueducts of stone, coursed, the beds and joints cut, and also the face of the sheeting. It is intended to be similar, in every respect, to the canal between Harper's Ferry and dam No. 5, with this exception, that it is proposed to dispense with the exterior walling, and substitute in its place a covering of broken stone, as it is obtained from the rock excavation, judiciously and carefully thrown over the bank as a protection against the abrasion of the river. Former experience, fortified by the observation of the last several years, of the effect of the current and ice of the Potomac upon stone thrown over a bank, in the form of 'Rip Rapping,' where surplus rock excavation made it necessary to dispose of the material, by throwing it over the walls already constructed, by which they were completely covered, and every stone of which, after three years' exposure, retains the same position in which it was originally thrown, has satisfied me that external walling is, in ordinary cases, a useless expenditure of labor and money."

In speaking of the materials necessary for the construction of the canal,

which he represents to be abundant, he says, "the hydrate of lime, of which the hydraulic cement is formed, occurs in several places along the river, between dam No. 5, and the contemplated dam No. 6. It occurs at dam No. 5, in the bed of the canal, and is extensively used by the contractors in the neighborhood of the dam; and from an examination of it, I deem its quality equal to any that I have ever seen used. The hydrate of lime can be found through the whole limestone region, bordering upon the Potomac, in inexhaustible quantities, and will hereafter form an important item in the list of articles transported by the canal to the District."

"The following is a brief, but accurate estimate of the cost of manufacturing cement:

A kiln to contain 1,000 bushels, will cost - - -	$100 00
Sixteen cords of wood will burn 1,000 bushels.	
Five days required to burn the same.	
Five days to drain and replenish it.	
The labor of procuring the stone, filling the kiln, burning the stone, and sixteen cords of wood, will cost - -	$85 00
Transporting 1,000 bushels to the mill - - -	15 00
Grinding 1,000 bushels, at ten cents - - -	100 00
Cost of 1,000 bushels at the mill - - - -	$200 00
or 20 cents per bushel.	

"The cement has, in the analysis of prices, been estimated at thirty cents, leaving ten cents per bushel for the transportation. There will be 100,000 bushels nearly of cement required to construct all the masonry of this subdivision."

Section No. 203, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$ 50 00
19,900	yards excavation of earth, at 12 cts. - -	2,388 00
1,000	do do rock, at 75 cts. - -	750 00
164	perches in culvert No. , 4 feet span, at $3 75 -	615 00
	Pit and paving - - - - - -	200 00
	Completion of lock No. 45 - - - -	5,000 00
		8,953 00
	Lock house, No. - - - - -	750 00
		$9,703 00

Section No. 204, *length* 1,800 *feet.*

	Grubbing, &c. - - - - -	$ 100 00
16,700	yards excavation of earth, at 15 cts. - -	2,505 00
1,500	do do rock, at 75 cts. - -	1,125 00
13,600	do embankment, not paid as excavation 120 to 660 feet, 16 cts. - - - - -	2,176 00
	Removing house - - - - -	125 00
300	perches in culvert No. , 6 feet span, at $3 75 -	1,125 00
	Pit and paving - - - - -	250 00
		$7,406 00

Section No. 205, length 3,400 feet.

	Grubbing, &c. - - - - -	$ 200 00
8,800	yards excavation of earth, at 15 cts. - -	1,320 00
8,000	do do rock, at 75 cts. - -	6,000 00
8,500	do embankment, from section 204, at 20 cts. -	700 00
258	perches, in culvert No. , 6 feet span, at $3 75 -	967 50
	Pit and paving - - - - -	300 00
164	perches, in culvert No. , 4 feet span, at $3 75 -	615 00
	Pit and paving - - - - -	200 00
	Lock house, No. , and flume - - -	1,750 00
	Lock No. 46, 8 feet lift - - - -	9,480 00
		$37,775 00

Section No. 206, length 2,200 feet.

	Grubbing, &c. - - - - -	$ 40 00
113,800	yards excavation of earth, at 15 cts. - -	17,070 00
5,800	do do rock, at $1 00 - -	5,800 00
	Lock No. 47, 8 feet lift - - - -	9,480 00
	Lock No. 48, do - - - -	9,480 00
	Lock No. 49, do - - - -	9,480 00
	Pivot bridge - - - - -	300 00
		$51,650 00

Section No. 207, length 3,200 fee

	Grubbing, &c. - - - - -	$ 200 00
23,200	yards excavation of earth, at 15 cts. - -	3,480 00
4,500	do do rock, at $1,00 - -	4,500 00
25,000	yards embankment, paid as excavation, at 13 cts. -	3,250 00
21,500	yards do not paid as excavation, at 15 cts. -	3,225 00
		$14,655 00

Section No. 208, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 50 00
15,700	yards excavation of earth, at 14 cts. - -	2,198 00
1,000	do do rock, at 75 cts. - -	750 00
2,000	yards embankment, paid as excavation, 120 to 660 feet, at 8 cts. - - - - -	160 00
13,500	yards embankment, not paid as excavation 120 to 240 feet, at 16 cts. - - - - -	2,160 00
468	perches in culvert No. , 10 feet span, at $3 87½ -	1,813 50
	Pit and paving - - - - -	250 00
164	perches in culvert No. , 4 feet span, at $3 87½ -	635 50
	Pit and paving - - - - -	150 00
		$8,167 00

Section No. 209, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 50 00
23,600	yards excavation of earth, at 12½ cts. - -	2,950 00
1,000	do do rock, at 75 cts. - -	750 00
4,800	yards embankment, paid as excavation, 120 to 660 feet, at 18 cts. - - - - -	384 00
5,400	yards embankment, not paid as excavation, 24 to 1,320 feet, at 18 cts. - - - -	972 00
695	perches in culvert No. , 12 feet span, at $3 75 -	2,606 25
	Pit and paving - - - - -	200 00
		$7,912 25

Section No. 210, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 50 00
35,200	yards excavation of earth, at 12 cts. - -	4,224 00
600	do do rock, at 75 cts. - -	450 00
2,500	yards embankment, paid as excavation, 120 to 660 feet, at 8 cts. - - - - -	200 00
468	perches, in road culvert No. , 10 feet span, at $3 75	1,755 00
	Pit and paving - - - - -	350 00
		$7,029 00

Section No. 211, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 10 00
18,490	yards excavation of earth, at 12 cts. - -	2,218 80
2,250	yards embankment, paid as excavation, 120 to 240 feet, at 6 cts. - - - - -	135 00
164	perches in culvert No. , 4 feet span, at $3 87½ -	635 50
	Pit and paving - - - - -	250 00
164	perches in culvert No. , 4 feet span, at $3 87½ -	635 50
	Pit and paving - - - - -	250 00
		$4,134 80

Section No. 212, length 2,800 feet.

	Grubbing, &c. - - - - -	$ 50 00
21,560	yards excavation of earth, at 13 cts. - -	2,802 80
500	do do rock, at 75 cts. - -	375 00
4,000	yards embankment, paid as excavation, 120 to 660 feet, at 10 cts. - - - - -	320 00
2,200	yards embankment, not paid as excavation, 120 to 660 feet, at 20 cts. - - - -	440 00
164	perches in culvert No. , 4 feet span, at $3 87½ -	635 50
	Pit and paving - - - - -	250 00
164	perches in culvert No. , 4 feet span, at $3 87½ -	635 50
	Pit and paving - - - - -	250 00
		$5,758 80

Section No. 213, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$ 90 00
24,600	yards excavation of earth, at 14 cts. - -	3,444 00
1,200	do do rock, at 60 cts. - -	720 00
2,800	yards embankment, paid as excavation, 120 to 660 feet, at 8 cts. - - - - -	224 00
		$4,478 00

Section No. 214, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$ 75 00
24,650	yards excavation of earth, at 13 cts. - -	3,204 50
1,000	do do rock, at 75 cts. - -	750 00
3,150	yards embankment, paid as excavation, 120 to 660, at 9 cts. - - - - -	283 50
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	250 00
	Farm ferry - - - - -	400 00
		$5,619 00

Section No. 215, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$ 50 00
37,800	yards excavation of earth, at 13 cts. - -	4,914 00
		$4,964 00

Section No. 216, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$150 00
26,900	yards excavation of earth, at 13 cts. - -	3,497 00
1,600	do do rock, at 75 cts. - -	1,200 00
	Farm ferry - - - - -	400 00
		$5,247 00

Section No. 217, *length* 2,800 *feet.*

	Grubbing, &c. - - - - -	$ 200 00
17,950	yards excavation of earth, at 12 cts. - -	2,154 00
7,850	yards embankment, paid as excavation, 120 to 1,000 feet, at 13 cts. - - - - -	1,020 50
9,200	yards embankment, not paid as excavation, less than ¼ mile, 20 cts. - - - - -	1,840 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	300 00
615	perches in culvert No. , 12 feet span, at $4 00 -	2,460 00
	Pit and paving - - - - -	300 00
		$8,930 50

Section No. 218, length 2,400 feet.

	Grubbing, &c. - - - - -	$ 125 00
28,320	yards excavation of earth, at 12 cts. - -	3,398 40
3,170	yards embankment, paid as excavation, 120 to 1,320 feet, at 12 cts. - - - - -	380 40
4,700	yards embankment, not paid as excavation, less than ¼ mile, at 25 cts. - - - -	1,175 00
260	perches in culvert No. , 4 feet span, at $4 00 -	1,040 00
	Pit and paving - - - - -	250 00
		$6,368 80

Section No. 219, length 2,800 feet.

17,200	yards excavation of earth, at 12 cts. - -	$2,064 00
2,840	yards embankment, paid as excavation, 120 to 1,320 feet, at 13 cts. - - - - -	369 20
2,280	yards embankment not paid as excavation, at 25 cts.	570 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	200 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	300 00
		$4,815 20

Section No. 220, length 2,600 feet.

19,860	yards excavation of earth, at 12 cts. - -	$2,383 20
500	do do rock, at 60 cts. - -	300 00
		$2,683 20

Section No. 221, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 150 00
31,180	yards excavation of earth, at 15 cts. - -	4,677 00
19,900	yards embankment, paid as excavation, 120 to 1,400 feet, at 10 cts. - - - - -	1,990 00
	Lock No. 50, 8 feet lift - - - -	9,480 00
	Flume and walling - - - -	1,000 00
	Lock house - - - - -	750 00
4,000	perches in aqueduct No. 6, at $7 55 - -	30,200 00
	Farm ferry - - - - -	400 00
		$46,897 00

Section No. 222, length 2,800 feet.

	Grubbing old orchard, &c. - - -	$ 50 00
21,250	yards excavation of earth, at 11 cts. - -	2,337 50
5,400	yards embankment, paid as excavation, 120 to 1,500 feet, at 15 cts. - - - - -	810 00

8,150	yards embankment, not paid as excavation, less than ¼ mile, at 20 cts. - - - -	1,630 00
164	perches in culvert No. , 6 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	250 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	200 00
	Farm and ferry - - - - -	400 00
		$6,989 50

Section No. 223, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 30 00
18,650	yards excavation of earth, at 10 cts. - -	1,865 00
2,150	yards embankment, paid as excavation, 120 to 600 feet, at 8 cts. - - - - -	172 00
	Farm ferry - - - - -	400 00
		$2,467 00

Section No. 224, length 2,600 feet.

	Grubbing, &c. - - - - -	$ 30 00
18,140	yards excavation of earth, at 11 cts. - -	1,995 40
1,000	do do rock, at 60 cts. - -	600 00
2,800	yards embankment, paid as excavation, at 8 cts. -	224 00
6,070	yards embankment, not paid as excavation, less than 120 feet, at 14 cts. - - - -	849 80
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	300 00
	Farm ferry - - - - -	400 00
		$5,055 20

Section No. 225, length 2,200 feet.

	Grubbing, &c. - - - - -	$ 50 00
4,000	yards excavation of earth, at 8 cts. - -	320 00
21,050	yards embankment, not paid as excavation, less than 240 feet, at 13 cts. - - - -	2,736 50
23,560	yards embankment, not paid as excavation, 120 to 1,000 feet, at 16 cts. - . - -	3,769 60
258	perches in culvert No. , 6 feet span, at $3 75 -	967 50
	Pit and paving - - - - -	300 00
		$8,143 60

Section No. 226, length 3,000 feet.

	Grubbing, &c. - - - - -	$ 150 00
9,940	yards excavation of earth, at 13 cts. - -	1,292 20
5,800	do do rock, at 75 cts. - -	4,350 00

10,200	yards embankment, not paid as excavation, 120 to 240 feet, at 6 cts. - - - -	612 00
45,200	yards embankment, paid as excavation, not less than ¼ mile, at 25 cts. - - - -	11,300 00
343	perches in culvert No. , 8 feet span, at $3 75 -	1,286 25
	Pit and paving - - - - -	250 00
164	perches in culvert No. , 4 feet span, at $3 75 -	615 00
	Pit and paving - - - - -	250 00
		$20,105 45

Section No. 227, length 2,800 feet.

	Grubbing, &c. - - - - -	$ 10 00
18,550	yards excavation of earth, at 11 cts. - -	2,040 50
6,950	yards embankment, paid as excavation, 120 to 900 feet, at 8 cts. - - - - -	556 00
258	perches in culvert No. , 6 feet span, at $4 00 -	1,032 00
	Pit and paving - - - - -	300 00
	Farm ferry - - - - -	400 00
		$4,338 50

Section No. 228, length 2,600 feet.

	Grubbing, &c. - - - - -	$150 00
24,100	yards excavation of earth, at 13 cents - -	3,133 00
1,200	do do rock, at 60 cents - -	720 00
14,880	do embankment, not paid as excavation, av. dis. 660 feet, at 16 cents - - - -	2,380 80
388	perches in culvert No. , 10 feet span, at $4 00 -	1,552 00
	Pit and paving - - - - -	250 00
		$8,185 80

Section No. 229, length 2,600 feet.

	Grubbing, &c. - - - - -	$50 00
18,230	yards excavation of earth, at 12 cents - -	2,187 60
5,600	do do rock, at 50 cents - -	2,800 00
7,540	do embankment, not paid as excavation, 120 to 660, feet at 16 cents - - - -	1,206 40
	Moving the road - - - - -	1,000 00
164	perches in culvert No , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	250 00
258	perches in culvert No. , 6 feet span, at $4 00 -	1,032 00
	Pit and paving - - - - -	300 00
		$9,482 00

Section No. 230, length 2,600 feet.

	Grubbing, &c. - - - - -	$50 00
17,100	yards excavation of earth, at 13 cents - -	2,223 00
5,250	do do rock, at 50 cents - -	2,625 00

14,600	yards embankment, not paid as excavation, 120 to 660 feet, at 16 cents - - - -	2,336 00
258	perches in culvert No. , 6 feet span, at $4,00 -	1,032 00
	Pit and paving - - - - -	250 00
	Farm ferry - - - - -	400 00
		$8,916 00

Section No. 231, *length* 2,600 *feet.*

	Grubbing, &c. - - - - -	$50 00
14,980	yards excavation of earth, at 12 cents - -	1,797 60
5,600	do embankment, paid as excavation, less than ¼ of a mile, at 10 cents - - - -	560 00
11,100	yards embankment, not paid as excavation, av. dis. 660 feet, at 17 cents - - - -	1,887 00
343	perches in culvert No. , 8 feet span, at $4 00 -	1,372 00
	Pit and paving - - - - -	200 00
		$5,866 60

Section No. 232, *length* 2,800 *feet.*

	Grubbing, &c. - - - - -	$30 00
28,140	yards excavation of earth, at 12 cents - -	3,376 80
5,750	do embankment, paid as excavation, av. dis. 600 feet, at 8 cents - - - - -	460 00
258	perches in culvert No. , 6 feet span, at $4 00 -	1,032 00
	Pit and paving - - - - -	250 00
		$5,148 80

Section No. 233, *length* 2,600 *feet.*

15,420	yards excavation of earth, at 12 cents - -	$1,850 40
2,240	do embankment, paid as excavation, av. dis. 600 feet, at 8 cents - - - - -	179 20
9,800	yards embankment, not paid as excavation, at 15 cts.	1,470 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	200 00
		$4,355 60

Section No. 234, *length* 2,800 *feet.*

	Grubbing, &c. - - - - -	$100 00
23,720	yards excavation of earth, at 12 cents - -	2,846 40
3,520	do do rock, at 75 cents - -	2,640 00
3,500	do embankment, paid as excavation, less than ¼ mile, at 10 cents - - - -	350 00
	Ferry - - - - - -	400 00
	Lock No. 51, 8 feet lift - - - -	9,480 00

	Flume and walling - - - -	1,000 00
	Lock house - - - - -	750 00
2,638	perches in aqueduct No. 7, at $7 00 - -	16,466 00
		$32,282 40

Section No. 235, length 2,600 feet.

	Grubbing, &c. - - - - -	$30 00
35,560	yards excavation of earth, at 13 cents - -	4,622 80
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	200 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	150 00
		$6,114 80

Section No. 236.

	Grubbing, &c. - - - - -	$20 00
22,270	yards excavation of earth, at 14 cents - -	3,117 80
2,500	do do rock, at 75 cents - -	1,875 00
2,500	do embankment, paid as excavation, 120 to 666 feet, at 8 cents - - - - -	200 00
	Pivot bridge - - - - -	1,000 00
		$6,212 80

Section No. 237.

	Grubbing, &c. - - - - -	$50 00
16,790	yards excavation of earth, at 12 cents - -	2,014 80
3,650	do embankment, not paid as excavation, less than 120 feet, at 13 cents - - - -	474 50
10,300	yards embankment, not paid as excavation, less than $\frac{1}{4}$ mile, at 14 cents - - - -	1,442 00
778	perches in culvert No. , 30 feet span, at $4 00 -	3,112 00
	Pit and paving - - - - -	200 00
		$7,293 30

Section No. 238.

	Grubbing, &c. - - - - -	$50 00
20,140	yards excavation of earth, at 10 cents - -	2,014 00
3,400	do embankment, paid as excavation, 120 to 660 feet, at 8 cents - - - - -	272 00
164	perches in culvert No. , 4 feet span, at $4 00 -	656 00
	Pit and paving - - - - -	200 00
		$3,192 00

Section No. 239.

	Grubbing, &c. - - - - -	$50 00
16,150	yards excavation of earth, at 10 cents - -	1,615 00
1,820	do embankment, not paid as excavation, less than 120 feet, at 12 cents - - - -	218 40
4,140	yards embankment, not paid as excavation, 120 to 660 feet, at 15 cents - - - -	621 00
		$2,504 40

Section No. 240.

	Grubbing, &c. - - - - -	$40 00
24,260	yards excavation of earth, at 10 cents - -	2,426 00
		$2,466 00

Section No. 241.

	Grubbing, &c. - - - - -	$20 00
20,720	yards excavation of earth, at 10 cents - -	2,072 00
5,770	yards embankment, paid as excavation, 120 to 1,320 feet, at 10 cents - - - - -	577 00
2,470	yards embankment, paid as excavation, 1,320 to 2,660 feet, at 20 cents - - - -	494 00
	Lock No. 52, 8 feet lift - - - -	9,480 00
	Flume and walling - - - -	1,000 00
	Lock house - - - - -	750 00
468	perches in culvert No. , 10 feet span, at $3 75	1,755 00
	Pit and paving - - - - -	200 00
		$16,348 00

Section No. 242.

	Grubbing, &c. - - - - -	$70 00
31,400	yards excavation of earth, at 13 cents - -	4,082 00
2,500	yards excavation of rock, at 75 cents - -	1,875 00
2,000	yards embankment, paid as excavation, 120 to 660 feet, at 8 cents - - - - -	160 00
258	perches in culvert No. , 6 feet span, at $4 00 -	967 50
	Pit and paving - - - - -	300 00
		$7,454 50

Section No. 243.

9,440	yards excavation of earth, at 13 cents - -	$1,227 20
	Grubbing, &c. - - - - -	200 00
7,960	yards excavation of rock, at 75 cents - -	5,970 00
11,200	yards embankment, not paid as excavation, less than 240 feet, at 15 cents - - -	1,680 00

35,260	yards embankment, not paid as excavation, average distance 1,320 feet, at 30 cents - - -	10,578 00
164	perches in culvert No. , 4 feet span, at $3 75 -	615 00
	Pit and paving - - - - -	230 00
		$20.520 20

Section No. 244.

	Grubbing, &c. - - - - -	$150 00
15,540	yards excavation of earth, at 11 cents - -	2,020 20
7,200	do of rock, at 75 cents - -	5,400 00
10,200	yards embankment, paid as excavation, average distance 660 feet, at 14 cents - - -	1,428 00
16,400	yards embankment, paid as excavation, 120 to 2,640 feet, average distance 1,320 feet, at 25 cents -	4,100 00
15,000	yards embankment, paid as excavation, less than 240 feet, at 14 cents - - - -	2,100 00
		$15,193 20

Section No. 245.

	Grubbing, &c. - - - - -	$20 00
27,520	yards excavation of earth, at 12 cents - -	3,302 40
1,500	yards embankment, paid as excavation, 120 to 240 feet, at 5 cents - - - - -	75 00
258	perches in culvert No. , 6 feet span, at $4 -	1,032 00
	Pit and paving - - - - -	250 00
		$4,679 40

Section No. 246.

	Grubbing, &c. - - - - -	$20 00
36,720	yards excavation of earth, at 12 cents - -	4,406 40
1,800	yards embankment, paid as excavation, 120 to 240 feet, at 5 cents - - - - -	90 00
		$4,516 40

Section No. 247.

	Grubbing, &c. - - - - -	$100 00
26,260	yards excavation of earth, at 13 cents - -	3,413 80
6,500	do of rock, at 75 cents - -	4,875 00
24,260	yards embankment, paid as excavation, average distance 1,200 feet, at 15 cents - - -	3,639 00
9,870	yards embankment, not paid as excavation, average distance 200 feet, to be had from Sec. 246, at 25 cents - - - - -	2,467 50
		$14,495 30

Section No. 248.

	Grubbing, &c. - - - - -	$250 00
22,160	yards excavation of earth, at 10 cents - -	2,216 00
3,500	do of rock, at 60 cents - -	2,100 00
13,100	yards embankment, paid as excavation, average distance 1,300 feet, at 15 cents - - -	1,965 00
14,470	yards embankment, not paid as excavation, average distance 1,000 feet, at 18 cents - - -	2,604 60
468	perches in road culvert No. , 10 feet span, at $3 75 - - - - - -	1,755 00
	Lock No. 53, 8 feet lift - - - -	9,480 00
	Flumes and walling - - - -	1,000 00
	Lock house - - - - -	750 00
		$20,370 60

Section No. 249.

14,190	yards excavation of earth, at 10 cents - -	$1,419 00
9,400	yards embankment, paid as excavation, at 12 cents	1,128 00
		$2,547 00

Section No. 250.

35,720	yards excavation of earth, at 12 cents - -	$4,286 40
2,600	yards embankment, paid as excavation, 120 to 240 feet, at 6 cents - - - - -	156 00
468	perches in road culvert No. , 10 feet span, at $4	1,872 00
	Pit and paving - - - - -	350 00
		$6,664 40

Section No. 251.

	Grubbing, &c. - - - - -	$100 00
33,050	yards excavation of earth, at 12 cents - -	3,966 00
7,460	yards embankment, paid as excavation, 120 to 660 feet, at 8 cents - - - - -	596 80
258	perches in culvert No. , 6 feet span, at $4 -	1,032 00
	Pit and paving - - - - -	200 00
258	perches in culvert No. , 6 feet span, at $4 -	1,032 00
	Pit and paving - - - - -	300 00
		$7,226 80

Section No. 252.

	Grubbing, &c. - - - - -	$250 00
24,840	yards excavation of earth, at 12 cents - -	2,980 80
3,800	do of rock, at 75 cents - -	2,850 00

20,850	yards embankment, paid as excavation, 120 to 1,980 feet, at 15 cents - - - - -	3,127 50
6,540	yards embankment, not paid as excavation, less than 1,320 feet from hill, at 20 cents - -	1,308 00
258	perches in culvert No. , 6 feet span, at $4 -	1,032 00
	Pit and paving - - - - -	250 00
		$11,798 30

Section No. 253.

	Grubbing, &c. - - - - -	$40 00
35,360	yards excavation of earth, at 13 cents - -	4,596 80
		$4,636 80

Section No. 254.

	Grubbing, &c. - - - - -	$200 00
31,160	yards excavation of earth, at 13 cents - -	4,050 80
5,800	do of rock, at 75 cents - -	4,350 00
14,560	yards embankment, paid as excavation, 660 to 1,320 feet, at 15 cents - - - -	2,184 00
		$11,784 80

Section No. 255.

	Grubbing, &c. - - - - -	$50 00
22,180	yards excavation of earth, at 13 cents - -	2,883 40
	Dam No. 6 - - - - -	35,000 00
	Guard lock No. 5 - - - -	7,000 00
		$44,933 40

GENERAL SUMMARY.

SECTIONS.		GRUBBING	EXCAVATION.					
			OF EARTH.			OF ROCK.		
Nos.	Length	Cost.	Cubic yards.	Price.	Cost.	Cubic yards.	Price.	Cost.
203	2600	$50 00	19,900	12	$2,338 00	1,000	75	$750 00
204	1800	100 00	16,700	15	2,505 00	1,500	75	1,125 00
205	3400	200 00	8,800	15	1,320 00	8,000	75	6,000 00
206	2200	40 00	113,800	15	17,070 00	5,800	100	5,800 00
207	3200	200 00	23,200	15	3,480 00	4,500	100	4,500 00
208	2600	50 00	15,700	14	2,198 00	1,000	75	750 00
209	2600	50 00	23,600	12½	2,950 00	1,000	75	750 00
210	2600	50 00	35,200	12	4,224 00	600	75	450 00
211	2600	10 00	18,490	12	2,218 80			
212	2800	50 00	21,560	13	2,802 80	500	75	375 00
213	2600	90 00	24,600	14	3,444 00	1,200	60	720 00
214	2600	75 00	24,650	13	3,204 50	1,000	75	750 00
215	2600	50 00	37,800	13	4,914 00			
216	2600	150 00	26,900	13	3,497 00	1,600	75	1,200 00
217	2800	200 00	17,950	12	2,154 00			
218	2400	125 00	28,320	12	3,398 40			
219	2800	-	17,200	12	2,064 00			
220	2600	-	19,860	12	2,383 20	500	60	300 00
221	2600	150 00	31,180	15	4,677 00			
222	2800	50 00	21,250	11	2,337 50			
223	2600	30 00	18,650	10	1,865 00			
224	2600	30 00	18,140	11	1,995 40	1,000	60	600 00
225	2200	50 00	4,000	8	320 00			
226	3000	150 00	9,940	13	1,292 20	5,800	75	4,350 00
227	2600	10 00	18,550	11	2,040 50			
228	2600	150 00	24,100	13	3,133 00	1,200	60	720 00
229	2600	50 00	18,230	12	2,187 60	5,600	50	2,800 00
230	2600	50 00	17,100	13	2,223 00	5,250	50	2,625 00
231	2800	50 00	14,980	12	1,797 60			
232	2600	30 00	28,140	12	3,376 80			
233	2600	-	15,420	12	1,850 40			
234	2600	100 00	23,720	12	2,846 40	3,520	75	2,640 00
235	2600	30 00	35,560	13	4,622 80			
236	2800	20 00	22,270	14	3,117 80	2,500	75	1,875 00
237	2600	50 00	16,790	12	2,014 80			
238	2600	50 00	20,140	10	2,014 00			
239	2600	50 00	16,150	10	1,615 00			
240	2600	40 20	24,260	10	2,426 00			
241	2800	20 00	20,720	10	2,072 00			
242	2600	75 00	31,400	13	4,082 00	2,500	75	1,875 00
243	2600	200 00	9,440	13	1,227 20	7,960	75	5,970 00
244	2600	150 00	15,540	11	2,020 20	7,200	75	5,400 00
245	2600	20 00	27,520	12	3,302 40			
246	2800	20 00	36,720	12	4,406 40			
247	2600	100 00	26,260	13	3,413 80	6,500	75	4,875 00
248	2600	250 00	22,160	10	2,216 00	3,500	60	2,100 00
249	2600	-	14,190	10	1,419 00			
250	2600	-	35,720	12	4,286 40			
251	2800	100 00	33,050	12	3,966 00			
252	2600	250 00	24,840	12	2,980 80	3,800	75	2,850 00
253	2600	40 00	35,360	13	4,596 80			
254	2600	200 00	31,160	13	4,050 80	5,800	75	4,350 00
255	2600	50 00	22,180	13	2,883 40			
26½	miles.	4,105 00	1,279,060	-	160,741 70	90,330	-	$66,500 00

GENERAL SUMMARY—Continued.

SECTIONS.		EMBANKMENT.					
		PAID AS EXCAVATION.			NOT PAID AS EXCAVATION.		
Nos.	Length.	Cubic yards.	Price.	Cost.	Cubic yards.	Price.	Cost.
203	2600						
204	1800	-	-	-	13,600	16	$2,176 00
205	3400	8,500	20	$17,120 00			
206	2200						
207	3200	25,000	13	3,250 00	21,500	15	3,225 00
208	2600	2,000	8	160 00	13,500	16	2,160 00
209	2600	4,800	8	384 00	5,400	18	972 00
210	2600	2,500	8	200 00			
211	2600	2,250	6	135 00			
212	2800	4,000	8	320 00	2,200	20	440 00
213	2600	2,800	8	224 00			
214	2600	3,150	9	283 50			
215	2600						
216	2600						
217	2800	7,850	13	1,020 50	9,200	20	1,840 00
218	2400	3,170	12	380 40	4,700	25	1,175 00
219	2800	2,840	13	369 20	2,280	25	570 00
220	2600						
221	2600	19,900	10	1,990 00			
222	2800	5,400	15	810 00	8,150	20	1,630 00
223	2600	2,150	8	172 00			
224	2600	2,800	8	224 00	6,070	14	849 80
225	2200	-	-	-	44,610	14½	6,506 10
226	3000	-	-	-	55,400	21½	11,912 00
227	2600	6,950	8	556 00			
228	2600	-	-	-	14,880	16	2,380 80
229	2600	-	-	-	7,540	16	1,206 40
230	2600	-	-	-	14,600	16	2,336 00
231	2800	5,600	10	560 00	11,100	17	1,887 00
232	2600	5,750	8	460 00			
233	2600	2,240	8	179 20	9,800	15	1,470 00
234	2600	3,500	10	350 00			
235	2600						
236	2800	2,500	8	200 00			
237	2600	-	-	-	13,950	13½	1,916 50
238	2600	3,400	8	272 00			
239	2600	-	-	-	5,960	14	839 40
240	2600						
241	2800	8,240	15½	1,271 00			
242	2600	2,000	8	160 00			
243	2600	-	-	-	46,460	26	12,258 00
244	2600	31,420	19¾	6,200 00			
245	2600	1,500	5	75 00			
246	2800	1,800	5	90 00			
247	2600	24,260	15	3,639 00	9,870	25	2,467 50
248	2600	13,100	15	1,965 00	14,470	18	2,604 60
249	2600	9,400	12	1,128 00			
250	2600	2,600	6	156 00			
251	2800	7,460	8	596 80			
252	2600	20,850	15	3,127 50	6,540	20	1,308 00
253	2600						
254	2600	14,560	15	2,184 00			
255	2600						
26½	miles.	266,240	-	$50,212 10	341,780	-	$64,130 10

GENERAL SUMMARY—Continued.

SECTIONS.		CULVERTS.					LOCKS.					
Nos.	Length.	Span.	Perches.	Price.	Cost.	Pits.	No.	Lift.	Price.	Cost.	Flumes and walling.	Lock houses.
203	2600	4	164	3 75	615 00	200	45	8	To complete.	5,000	1,000	750
204	1800	6	300	3 75	1,125 00	250						
205	3400	6	258	3 75	967 50	300	46	8	1,185	9,480	1,000	750
		4	164	3 75	615 00	200						
206	2200	–	–	–	–	–	47					
207	3200	–	–	–	–	–	48	24	1,185	28,440	3,000	750
		–	–	–	–	–	49					
208	2600	10	468	3 87½	1,813 50	250						
		4	164	3 87½	635 50	150						
209	2600	12	695	3 75	2,606 25	200						
210	2600	10	468	3 75	1,755 00	350						
211	2600	4	164	3 87½	635 50	250						
		4	164	3 87½	635 50	250						
212	2800	4	164	3 87½	635 50	250						
		4	164	3 87½	655 50	250						
213	2600											
214	2600	4	164	4 00	656 00	250						
215	2600											
216	2600											
217	2800	4	164	4 00	656 00	300						
		12	615	4 00	2,460 00	300						
218	2400	4	260	4 00	1,040 00	250						
219	2800	4	164	4 00	656 00	200						
		4	164	4 00	656 00	300						
220	2600											
221	2600	–	–	–	–	–	50	8	1,185	9,480	1,000	750
222	2800	4	164	4 00	656 00	250						
		4	164	4 00	656 00	200						
223	2600											
224	2600	4	164	4 00	656 00	300						
225	2200	6	258	3 75	967 50	300						
226	3000	8	343	3 75	1,286 25	250						
		4	164	3 75	615 00	250						

227	2600	6	258	4 00	1,032 00	300						
228	2600	10	388	4 00	1,552 00	250						
229	2600	4	164	4 00	656 00	250						
		6	258	4 00	1,032 00	300						
230	2600	6	258	4 00	1,032 00	250						
231	2800	8	343	4 00	1,372 00	200						
232	2600	6	258	4 00	1,032 00	250						
233	2600	4	164	4 00	656 00	200						
234	2600	–	–	–	–	–	51	8	1,185	9,480	1,000	750
235	2600	4	164	4 00	656 00	200						
		4	164	4 00	656 00	150						
236	2800											
237	2600	30	778	4 00	3,112 00	200						
238	2600	4	164	4 00	656 00	200						
239	2600											
240	2600											
241	2800	10	468	3 75	1,755 00	200	52	8	1,185	9,480	1,000	750
242	2600	–	258	3 75	967 50	300						
243	2600	4	164	3 75	615 00	230						
244	2600											
245	2600	6	258	4 00	1,032 00	250						
246	2800											
247	2600											
248	2600	10	468	3 75	1,755 00	–	53	8	1,185	9,480	1,000	750
249	2600											
250	2600	10	468	4 00	1,872 00	350						
251	2800	6	258	4 00	1,032 00	200						
		6	258	4 00	1,032 00	300						
252	2600	–	258	4 00	1,032 00	250						
253	2600											
254	2600											
255	2600											
26½	miles.	–	12,344	–	43,172 00	10,880	–	72	–	80,840	9,000	5,250

GENERAL SUMMARY—Continued.

SECTIONS.		AQUEDUCTS.						SUNDRIES.		TOTALS.
Nos.	Length.	No.	No. of arch.	Chord or span	Perches.	Price.	Cost.	Items.	Cost.	Cost.
203	2600	-	-	-	-	-	-	- -	-	$9,703 00
204	1800	-	-	-	-	-	-	Removing house -	$125	7,406 00
205	3400	-	-	-	-	-	-	- -	-	37,775 00
206	2200	-	-	-	-	-	-	Pivot bridge -	300	51,650 00
207	3200	-	-	-	-	-	-	- -	-	14,655 00
208	2600	-	-	-	-	-	-	- -	-	8,167 00
209	2600	-	-	-	-	-	-	- -	-	7,912 25
210	2600	-	-	-	-	-	-	- -	-	7,029 00
211	2600	-	-	-	-	-	-	- -	-	4,134 80
212	2800	-	-	-	-	-	-	- -	-	5,758 80
213	2600	-	-	-	-	-	-	- -	-	4,478 00
214	2600	-	-	-	-	-	-	Farm ferry -	400	5,619 00
215	2600	-	-	-	-	-	-	- -	-	4,964 00
216	2600	-	-	-	-	-	-	Farm ferry -	400	5,247 00
217	2800	-	-	-	-	-	-	- -	-	8,930 50
218	2400	-	-	-	-	-	-	- -	-	6,368 80
219	2800	-	-	-	-	-	-	- -	-	4,815 20
220	2600	-	-	-	-	-	-	- -	-	2,683 20
221	2600	6	1	100	4,000	$7 55	$30,200	Farm ferry -	400	46,897 00
222	2800	-	-	-	-	-	-	Farm ferry -	400	6,989 50
223	2600	-	-	-	-	-	-	Farm ferry -	400	2,467 00
224	2600	-	-	-	-	-	-	Farm ferry -	400	5,055 20
225	2200	-	-	-	-	-	-	- -	-	8,143 60
226	3000	-	-	-	-	-	-	- -	-	20,105 45
227	2600	-	-	-	-	-	-	Farm ferry -	400	4,338 50
228	2600	-	-	-	-	-	-	- -	-	8,185 80
229	2600	-	-	-	-	-	-	- -	-	8,482 00
230	2600	-	-	-	-	-	-	Farm ferry -	400	8,916 00

231	2800	-	-	-	-	-	-	-	-	-	5,866 60
232	2600	-	-	-	-	-	-	-	-	-	5,148 80
233	2600	-	-	-	-	-	-	-	-	-	4,355 60
234	2600	7	-	-	2,638	7 00	16,446	Farm ferry	-	400	32,282 40
235	2600	-	-	-	-	-	-	-	-	-	6,114 80
236	2800	-	-	-	-	-	-	Pivot bridge at Hancock	-	1,000	6,212 80
237	2600	-	-	-	-	-	-	-	-	-	7,293 30
238	2600	-	-	-	-	-	-	-	-	-	3,192 00
239	2600	-	-	-	-	-	-	-	-	-	2,504 40
240	2600	-	-	-	-	-	-	-	-	-	2,466 00
241	2800	-	-	-	-	-	-	-	-	-	14,598 00
242	2600	-	-	-	-	-	-	-	-	-	7,459 50
243	2600	-	-	-	-	-	-	-	-	-	20,520 20
244	2600	-	-	-	-	-	-	-	-	-	15,198 20
245	2600	-	-	-	-	-	-	-	-	-	4,679 40
246	2800	-	-	-	-	-	-	-	-	-	4,516 40
247	2600	-	-	-	-	-	-	-	-	-	14,495 30
248	2600	-	-	-	-	-	-	-	-	-	20,370 60
249	2600	-	-	-	-	-	-	-	-	-	2,547 00
250	2600	-	-	-	-	-	-	-	-	-	6,664 40
251	2800	-	-	-	-	-	-	-	-	-	7,226 80
252	2600	-	-	-	-	-	-	-	-	-	11,798 30
253	2600	-	-	-	-	-	-	-	-	-	4,636 80
254	2600	-	-	-	-	-	-	-	-	-	11,784 80
255	2600	-	-	-	-	-	-	Dam No. 6	-	35,000	44,933 00
$26\frac{1}{2}$	miles.	-	-	-	6,638	-	$46,666	-	-	$40,025	583,942 00
						Add ten per cent. for contingencies, &c.		-	-	-	58,394 20
											642,336 20
						Add for condemnation		-	-	-	21,340 00
		Average cost per mile $25,000.					Total cost		-	-	$663,676 20

The preceding estimates, embracing 26½ miles of canal, an elevated dam across the Potomac, nine locks, two aqueducts, forty-five culverts, a pivot bridge at Hancock, besides those across the several locks, and ten farm ferries, will be found, on a careful comparison, to exceed, though to no great extent, the cost of similar works, for an equal distance below it.

1,279,060 cubic yards of excavation of common earth, at $160,741 10, make the average cost per cubic yard $12\frac{567}{1000}$, being $1\frac{567}{1000}$ more than the average cost on eight miles below dam No. 5.

The 90,330 cubic yards of rock excavation have an average cost of $73\frac{62}{100}$ cents per cubic yard, which exceeds the contract price of the same work for the eight miles below, by $13\frac{62}{100}$.

The 608,020 cubic yards of embankment average $18\frac{805}{1000}$, being rather more than a cent a cubic yard higher than the average price of embankment on the entire line below.

The 12,344 perches of masonry in the culverts average less, by 7⅓ cts. the perch, than the masonry immediately below; but the locks are put down at a price, higher by $180 a foot lift, and the aqueducts, at a price per perch 45 cents less than the cost of that across the Conococheague; while it is now ascertained, that the masonry, below, is the most profitable part of the last contracts, excellent stone and hydraulic lime being abundant on this part of the line of the canal.

The contingencies, exclusive of a distinct allowance for lands, are put down at 10 per cent., which is found, below, to be an allowance amply sufficient to cover the cost both of lands and contingencies.*

* A summary of Mr. Cruger's report of the probable cost of the 26½ miles of canal, will be found to comprehend—

1,279,060	cubic yards of excavation,	at $12\frac{567}{1000}$, - - - -	$160,741 70
90,330	do of rock,	at $73\frac{620}{1000}$, - - - -	66,500 00
608,020	do of embankment,	at $18\frac{805}{1000}$, - - - -	114,342 20
	45 culverts, comprehending 12,344 perches, at $3 72¾ the perch, exclusive of the pits, - - - - - -		48,172 00
Culvert pits, 45 in number, - - - - - - -			10,880 00
9 locks, of 8 feet lift each, including flumes and lock houses, 89,840 + 5,250 = 95,090, - - - - - - - - -			95,090 00
2 aqueducts, of 6,638 perches, at - - - - - - - -			46,666 00
1 dam, - - - - - - - - -			35,000 00
10 farm ferries and 1 pivot bridge, - - - - - -			5,025 00
Lands, - - - - - - - - -			21,340 00
Contingencies, - - - - - - - - -			58,394 20
			$663,676 20

The heaviest contract for the construction of the works on the part of the canal immediately below the above, comprehended, for eight miles in extent, an allowance of 11 cents per cubic yard for all excavation except of rock; 60 cents per cubic yard for the latter; $1,000 dollars a foot lift for several locks; $4 per perch for the culverts, and $8 per perch for the aqueduct across the Conococheague; all of which prices are less than those above mentioned. In the excavation alone, the estimated prices exceed the actual cost below by $32,000, and the locks by $17,000 more. In the allowance for lands and contingencies, there is believed to be a similar leaning to over-estimation, to the extent of $10,000 more; so that the cost of those 26½ miles will not exceed $23,000 per mile.

M.

New York did not begin to collect tolls on her canals, except on a very small scale, before the autumn of 1822, above five years from the time when they were commenced.

The tolls on the Erie and Champlain canals were as follows:

For 1822 - - -	44,486
1823 - - -	89,988
1824 - - -	319,320
1825 - - -	521,345
1826 - - -	750,759
1827 - - -	847,759
1828 - - -	897,265
1829 - - -	971,685
1830 - - -	1,056,922
1831 - - -	1,193,435

The toll on the Erie canal, alone, was for the year 1832, $1,085,602 28, and for 1833, $1,290,136 20.

In reply to certain queries addressed to the President of the Board of Canal Commissioners, General Stephen Van Rensselaer, by the chairman of the Committee on Roads and Canals, he was politely favored with the following answers:

"1st. *Property that passed Utica on the Erie canal in* 1833.

Domestic spirits,	1,609,612 gls.	Bran and ship stuff,	300,518 bhs
Boards & scantling,	40,804,371 ft.	Peas and beans	8,260 "
Timber,	1,733,255 ft.	Clover & grass seed,	1,460,628 lbs.
Shingles,	55,287 m.	Wool,	1,116,673 "
Staves,	9,264,523	Cheese,	1,857,944 "
Flour,	966,813 bls.	Butter and lard,	4,554,215 "
Provisions,	27,919 "	Hops,	443,326 "
Salt,	62,860 "	Fur and peltry,	268,521 "
Ashes,	29,508 "	Gypsum,	18,750,501 "
Lime,	15,357 "	Stone,	8,805,039 "
Beer,	586 "	Merchandise,	157,357,547 "
Cider,	284 "	Furniture,	7,595,732 "
Wood,	4,808 cds	Clay,	1,821,565 "
Wheat,	1,175,423 bhs	Coal,	6,423,090 "
Coarse grain,	302,578 "	Pig iron,	1,810,215 "

The amount of tolls collected on boards and scantling, estimated at - - - - - $90,000

Timber, - - - - - - 34,680

$124,680

"Whole amount of tolls on the Erie and Champlain canals, for the year 1833, - - - - $1,422,695 22

"2d. The rates of transportation vary on different articles, but the average price without tolls is about 2 cents per ton per mile. Salt, plaster, and agricultural productions are charged at from 1 to 1¼ cents; merchandise, furniture, &c. at 3 cents per ton per mile.

"3d. The number of boats on the Erie and Champlain canals is 2,328.

"4th. The greatest tonnage is 55 tons, but the average freight of the loaded boats is about 40 tons.

"5th. Two horses are required for freight boats; they are navigated by five men, travel day and night, and perform fifty miles in twenty-four hours.

"6th. The rates of tolls have been reduced; a copy is enclosed.

"7th. There are no steamboats on the Erie canal; several attempts have been made to introduce steam, without success; no sheet iron boats have as yet been constructed.

"8th. Packets are restricted to 4 miles per hour, but in one instance a small packet performed 124 miles in 24 hours for several weeks in succession; this speed, however, proved injurious to the canal banks, and was interdicted by the canal commissioners.

"Late last fall an experiment was tried at Utica with a light double boat on a new plan, and when the speed was ten miles per hour, the boat rode upon the waves, and created but little surf upon the banks. The highest speed obtained with three horses was 12 miles per hour.

"The boat consists of a platform and neat cabin, resting on two boats placed three feet apart, each being 70 feet long by three feet wide, forming altogether a boat seventy feet long by nine feet wide. The trial does not warrant the construction of new boats upon this principle."

TWENTY THIRD CONGRESS—FIRST SESSION.

IN THE HOUSE OF REPRESENTATIVES,

June 4, 1834.

On motion of Mr. Mercer,

Resolved, That a communication, received through the chairman of the Committee on Roads and Canals, from A. C. Flagg, Esq., of New York, be added to the appendix of the report No. 414, and that the plates accompanying the Essay of McNeill on Canal Navigation be reduced to one, and make part of the essay which it is designed to illustrate.

Attest:

W. S. FRANKLIN,
Clerk House of Representatives.

The Committee on Roads and Canals avail themselves of this occasion to tender to Thomas P. Cope, Esq. of Philadelphia, to Col. Thomas H. Perkins, of Boston, and to Gen. Stephen Van Rensselaer, and A. C. Flagg, Esq., of New York, their thanks, for the materials which they have supplied to this appendix.

COMPTROLLER'S OFFICE, ALBANY,

May 31, 1834.

SIR: General Van Rensselaer handed your letter of the 21st instant to me, and requested that such answers to your inquiries as could be furnished from the returns to this office, should be sent to you at Washington; the General having to go to New York, on account of the ill health of his daughter, resident in that city.

Statements Nos. 1 and 2, give the articles arriving at and departing from Albany and Troy. At each of these places there is a connexion between

the Hudson river and the canal. The statement for West Troy embraces the articles which pass in and out of the river, from and to the canal, at that point; but does not embrace the property passing the West Troy office on the canal, to and from Albany. Nos. 1 and 2 are to be added together, to ascertain the amount of property which reaches the Hudson river from the canals, as well as that which leaves the river, and is transported upon the canals. There is another connexion between the Hudson river and the northern canal, by a sloop lock, above Troy, in the river, and a side cut at Waterford from the river into the Champlain canal. The property passing through this channel is not very great, except as to the article of square timber in rafts.

No. 3 is an abstract of the statistical table kept at Buffalo.

The tables kept at West Troy and Albany do not enable us to separate the property transported on each canal.

The whole amount of tolls collected upon the property transported upon the canals will be seen in the report which is sent you by this mail.

With great respect,

Your obedient servant,

A. C. FLAGG.

C. F. MERCER,

Representative in Congress, Washington.

No. 1.

The whole quantity of down freight upon which toll is charged by weight, that was conveyed on the New York canals to Albany, in 1833, amounts to one hundred and fifty-two thousand nine hundred and thirty-five tons, at 2,000 lbs. per ton.

Arrived.

734,133	barrels of	flour.
22,922	do	ashes.
13,489	do	provisions.
19,908	do	whiskey.
873	hogsheads	do.
17,116	bushels	salt.
298,504	bushels of	wheat.
122,944	do	coarse grain.
257,252	do	barley.
2,187	boxes	glass.

And also the following upon which toll is not charged by the ton:

20,960	cords of	wood.
74,350	feet	timber.
55,338,547	do	lumber.
74 350	M	shingles.

And 68,321 tons of merchandise, furniture, and sundries sent up the canal from Albany.

The whole amount of toll received by the collector at Albany, is $323,689 88, making an increase of $87,053 56 over the receipts of last year.

The whole number of boats arrived and cleared was 16,834.

No. 2.

Statement of freight from the West and North, which passed through the West Troy side cut into the Hudson river, during the year 1833.

45,493,516	feet of	boards and scantling.
1,562,960	cubic feet of	timber.
17,562	thousand	shingles.
10,273	cords of	wood.
4,098	tons of	staves.
8,565	do	stone.
189,128	barrels of	flour.
11,731	do	beef and pork.
9,161	do	ashes.
11,681	do	salt.
9,016	boxes of	glass.
623,003	bushels of	wheat.
84,196	do	barley.
52,640	do	oats and corn.
609,693	pounds of	wool.
609,951	do	tobacco.
2,124,736	do	butter and lard.
3,422,448	do	cheese.
419,088	do	seed.
16,256,776	do	sundries.
19,003	barrels	domestic liquor.

An account of freight cleared, West and North, at the collector's office West Troy, upon the Erie and Champlain canals, during the year 1833.

63,055,961	pounds of	merchandise.
2,676,799	do	furniture.
11,471,615	do	sundries.
784,390	do	iron castings.
1,367,164	do	hides and skins.
657,841	do	cotton.
4,236	barrels of	beef and pork.
65,418	do	flour.
15,896	do	salt.

No. 3.

ACCOUNT of property delivered at and passing Buffalo, west, on the Erie canal, during the year 1833.

	For Buffalo, &c.	Destined out of the State.	Total.	Increase over last year.	Decrease from last year.
Merchandise, - - - pounds,	12,902,296	28,683,708	41,586,004	15,321,988	
H. H. goods, and farmers and mechanics' tools, -	946,100	7,568,846	8,514,946	2,677,425	
Foreign hides, - - - - -	288,680	78,356	367,036	40,184	
Mill and other wrought stone, coal, &c. -	2,317,891	289,736	2,607,627	1,086,297	
Sundries, - - - - -	1,073,282	–	1,073,282	569,940	
Salt, (70,929 bbls.) - - - -	3,725,632	18,295,650	22,021,282	4,334,825	or 9,594 bbls.
	21,253,881	54,916,296	76,170,177	24,030,659	
Cords wood, - - - - -	6,130	–	6,130	742	

Account of property cleared at and passing Buffalo, east.

	From Buffalo.	From out State.			
Bushels wheat, - - - - -	600	113,737	114,337	13,576	
Barrels flour, - - - - -	3,099	75,565	78,666	56,734	
Do pork, - - - - -	–	3,651	3,651	–	1,338
Do beef, - - - - -	–	622	622	452	
Do whiskey, - - - -	165	2,320	2,485	267	
Do oil, - - - - -	–	43	43	–	1
Do fish, - - - - -	–	279	279	3	
The weight of the above, together with that of other articles not enumerated by weight below, is lbs.	854,551	28,370,137	29,224,688	13,860,828	

ACCOUNT—Continued.

	From Buffalo.	From out State.	Total.	Increase over last year.	Decrease from last year.
Brought forward,	854,551	28,370,137	29,224,688	13,860,828	
Furs,	–	203,999	203,999	–	10,135
Iron castings,	–	1,514,093	1,514,093	577,204	
Household furniture, (estimated,)	134,835	134,820	269,655	93,390	
Tobacco,	–	1,071,238	1,071,238	298,879	
Hemp,	–	35,269	35,269	–	23,008
Pig iron,	–	2,334,513	2,334,513	812,667	
Butter,	11,284	887,816	899,100	110,363	
Cheese,	24,795	166,649	191,444	41,561	
Wool,	17,522	133,862	151,384	107,536	
Deer skins and other raw hides,	57,290	162,902	220,192	No separate	acc't last year
Grindstones,	–	278,845	278,845	57,616	
Pot and pearl ashes,	1,548,306	2,688,708	4,237,014	16,787	
699 M staves,	–	4,246,210	4,246,210	539,417	or 176 M
	2,648,583	42,229,061	44,877,644	16,516,248	33,143
Feet lumber,	56,815	274,325	331,140	79,639	

NOTE.—The foregoing account has been kept, as heretofore, from the bills of lading of property passing west, from which the destination has been ascertained, excepting the household furniture, &c., which is estimated. The articles under the head of "sundries" consist chiefly of agricultural productions intended for this market. Although the salt trade is almost exclusively managed by dealers in this place, yet it is estimated by those best qualified to judge of the matter, that 12,000 barrels are required for that part of the population of this State who are supplied from this place; I have, therefore, adopted this estimate, and have set down the balance, 58,929 barrels, as going out of the State. No part of the property passing between this place and Black Rock, neither horses carried for the purpose of towing them, is here set down, but the flour shipped at Black Rock, and cleared at this office, is included in this account, and is set down as from out of the State, because the wheat from which it was made was all from Ohio.

Believing that the object in requiring the account was to show the actual commerce and business of the canal and country, I have endeavored to comply with that object according to the best of my ability.

T. W. BARKER, *Collector.*

N.

A general statement of the business of the Schuylkill Navigation Company from its commencement, extracted from the Report of the President and Managers to the Stockholders of the 6th of January, 1834.

Years.	Total tonnage.	Tons of coal.	Toll on coal.	Toll on other articles.	Total toll.	Descending toll.	Ascending toll.	Amount of rents.
1815								
1816	No receipts in these years.							
1817								
1818	-	-	-	-	233 00			
1819	-	-	-	-	1,202 16			
1820	-	-	-	-	803 07			
1821	-	-	-	-	1,792 60			
1822	-	-	-	-	1,054 97			
1823	-	-	-	-	1,964 88			
1824	-	-	-	-	635 00			
1825	-	6,500	9,700 00	6,075 74	15,775 74	13,363 74	2,412 00	4,700 00
1826	32,404	16,767	25,147 00	18,961 87	43,108 87	32,968 97	10,139 90	4,900 00
1827	65,501	31,360	33,317 00	24,832 74	58,149 74	42,865 27	15,284 47	6,967 00
1828	105,463	47,284	46,202 00	40,969 56	87,171 56	64,001 56	23,170 00	7,618 00
1829	134,524	79,973	77,032 00	43,007 00	120,039 00	92,186 00	27,853 00	10,574 00
1830	180,755	89,984	87,192 00	60,973 95	148,165 95	105,231 36	42,934 59	13,800 00
1831	196,413	81,854	78,781 00	55,224 32	134,005 92	99,995 52	34,010 40	13,750 00
1832	327,921	209,271	199,784 00	65,045 70	264,829 70	218,218 00	46,611 70	15,207 00
1833	445,849	252,971	228,138 00	97,348 00	325,486 63	263,744 00	61,743 63	16,673 00

In a late work, the following description is given of this canal, which supplies some of the defects of that in the report:

"Schuylkill Canal and Navigation Company, incorporated in 1815. The work was commenced in 1816, and the canal has now been in operation several years. Length, 110 miles; breadth at the surface, 36 feet—at the bottom, 24; depth, 4 feet; lockage, 620 feet. It extends from Philadelphia to Reading, and thence to Mount Carbon. It comprises 31 dams, commencing at Fair Mount water works, near Philadelphia, by which, is produced a slack water navigation of 45 miles; 125 locks, 80 feet long by 17 wide, of which 28 are guard-locks; 17 arched aqueducts, a tunnel of 450 feet in length, cut through and under solid rock; and 65 toll and gate-houses. The dams are from 3 to 27 feet in height."

STATEMENT of the accounts of the Company, January 1, 1834.

Dr.		Cr.	
Capital stock,	$1,640,100 00	General charges, being cost of the works, including real estate and damages,	$2,974,659 69
Loans,	1,326,380 13	Current expenses, being cost of repairs, salary to officers, lock-keepers' wages, &c. this year,	95,117 71
Tolls,	328,654 98	Interest account this year,	63,828 24
Rents,	10,873 79	Dividend No. 7, made in August last,	96,463 00
Contingent fund,	4,759 80	Available funds at interest,	49,216 50
		Individual accounts unsettled,	24,304 76
		Cash, balance,	7,178 80
	$3,310,768 70		$3,310,768 70

TABULAR STATEMENT of the tonnage and toll of the articles which ascended and descended the Schuylkill river during the year 1833, *showing the number of tons of each kind, and the amount of toll received on each, prepared from the report of the President and Managers of the Schuylkill Navigation Company, made to the Stockholders on the 6th of January,* 1834.

	Ascending.				Descending.				Total am't of tonnage ascending and descending.	Total am't of tolls ascending and descending.
	Tons.	Tolls.	Amount of tonnage.	Amount of tolls.	Tons.	Tolls.	Amount of tonnage.	Amount of tolls.		
		Dollars.		*Dollars.*		*Dollars.*		*Dollars.*		*Dollars.*
Productions of the forest—										
Lumber	–	–	2,532	1,277 96	13,470	6,798 58				
Bark	–	–	–	–	411	207 44				
Wood	–	–	–	–	1,790	903 45				
							15,671	7,909 47	18,203	9,187 43
of the water—										
Fish	–	–	2,597	1,310 76	–	–	–	–	2,597	1,310 76
of agriculture—										
Grain	–	–	1,339	675 82	9,337	4,712 57				
Tobacco	–	–	–	–	61	30 79				
							9,398	4,743 36	10,737	5,419 18
of minerals and fossils—										
Coal	1,512	763 14	–	–	252,971	228,138 00				
Iron ore	11,705	5,907 75	–	–	2,252	1,136 63				
Marble and stone	467	235 70	–	–	2,383	1,202 75				
Gravel	2,149	1,084 64								
Plaster	26,494	13,372 05								
Lime and limestone	12,275	6,195 44	–	–	53,219	26,860 69				
			54,602	27,558 72			310,825	257,338 07	365,427	284,896 79
Manufactured products indiscriminately arranged—										
Flour	382	192 80	–	–	12,107	6,110 65				

STATEMENT—Continued.

	Ascending.				Descending.				Total am't of tonnage ascending and descending.	Total am't of tolls ascending and descending.
	Tons.	Tolls.	Am't of tonnage.	Amount of tolls.	Tons.	Tolls.	Am't of tonnage.	Amount of tolls.		
Salt	3,434	1,733 21								
Pork	–	–	–	–	284	143 34				
Butter	–	–	–	–	448	226 11				
Whiskey	–	–	–	–	1,759	887 80				
Porter	199	100 44								
Iron	2,886	1,456 62	–	–	2,046	1,032 66				
Blooms, pig iron & castings	779	393 18	–	–	4,607	2,325 25				
Nails	16	8 08	–	–	1,595	805 03				
Bricks	184	92 87								
Leather	–	–	–	–	254	128 20				
			7,880	3,977 20			23,100	11,659 04	30,980	15,636 24
Merchandise	14,190	7,161 98	–	–	–	–	–	–	14,190	7,161 98
Sundries	1,057	533 49	–	–	904	456 27	–	–	1,961	989 96
Passing Fair Mount locks only	598	301 82	–	–	1,156	583 46	–	–	1,754	885 28
			15,845	7,997 29			2,060	1,039 73		
			84,795	42,797 75			361,054	282,689 67	445,849	*325,487 42

*To which sum, if 21 cents be added, for loss of small fractions in the numerous calculations, the aggregate will agree precisely with the Schuylkill report.

The tolls on all commodities *but coal*, are stated as if the same tonnage paid the same toll, and for the same distance, which is not the fact, the table being designed to show their relative proportion of the toll not charged on coal.

The tonnage of all the commodities comprehended in the tables of the ascending and descending trade of the Schuylkill is correctly stated above; but the tables of the company, affording only the amount of the revenue from coal, the tolls of all the other commodities are extended, without reference to the sum, actually yielded, by each; which depends on the rate of toll, and the distance which each commodity may have been transported.

It is to be regretted that the valuable statistical knowledge, which such tables may be calculated to afford, is not rendered more useful to distant inquirers by more complete details and a better arrangement than usually distinguish such tables. For the stockholders, they afford all the intelligence, perhaps, that they may desire, on the score of profit; and the suggestions, here thrown out, appeal not to the sense of duty which animates the officers of all those useful works, but to their public spirit, and known intelligence.

The committee are enabled, by the politeness of Thomas P. Cope, Esq., of Philadelphia, to add the table of the tolls received on the Union canal in the year ending on the 1st of November last, which serves further to corroborate, considering all the disadvantages to which that work is exposed, the calculations of future profit from the stock of the Chesapeake and Ohio canal; a work, commanding like resources in all respects, and fortified by its enlarged dimensions, against all competition for the supply of its natural markets.

Statement of the whole amount of tonnage which passed the Union canal from the 1st of November, 1832, to the 1st of November, 1833, amounting to 85,876 tons, 6 cwt. 2 qrs.

	Weighing.		
	Tons.	Cwt.	Qrs.
Flour, 70,595 barrels,	6,723	5	3
Wheat and rye, 324,260 bushels,	8,106	10	
Whiskey, 12,408 barrels,	1,551	2	
Iron, bar, pig, and castings,	7,205	2	
Iron ore,	2,306	10	
Coal, bituminous and anthracite,	5,488	3	
Lumber, 14.677,750 feet,	14,677	15	2
Shingles, 5,991,600 do	2,995	16	1
Staves,	188	8	3
Gypsum,	12,558	13	
Fish, 14,370 barrels,	1,916	5	
Salt, 124,200 bushels,	3,104	19	1
Merchandise,	9,154	7	1
Sundries, consisting of corn, flaxseed, tobacco, hemp, clover seed, lard, butter, limestone, marble, bricks, leather, pork, &c.	9,809	8	3
	85,876	6	2

"The tolls received from the 1st of November, 1832, to the 1st of November, 1833, amount to $103,462 45, showing an increase over last year's receipts of 75 per cent., the tolls of that year amounting to $59,061 06, thus establishing the fact, that the anticipations of the company have not been based upon idle or illusory speculations, but founded upon sound and correct calculation. It is a subject of pleasing reflection, not only to the friends of the Union canal, but to all who feel an interest in the welfare of our State, and of internal improvements, to find that whatever discouragement may cloud the incipient prospects of these great and expensive works, all difficulties may be surmounted by perseverance and good management, and the result prove beneficial and profitable to those who have invested their funds in the undertaking. A large and progressively increasing trade may be safely calculated on from year to year through this canal, aided, as it will be, by the completion of the State canals, and other valuable improvements, facilitating and enlarging the transportation to and from the most distant quarters of the commonwealth."

For O Vide Z.

P.

In a preceding note, (vide K.) the belief has been expressed, that a canal will yet be constructed, between Georgetown and Baltimore. This belief was there stated, in connexion with the motives which led to the extension of the Chesapeake and Ohio canal through Georgetown, to the mouth of Rock creek, and the enlargement of its dimensions below its last feeder from the Potomac, at the head of the Little falls; so as to supply this canal, with water, at a suitable elevation.

The following are the details of the general estimate of the distances there stated, between New York and Pittsburg, by the northern route through the Erie canal, and by the southern route, which will be provided by the completion of the Chesapeake and Ohio and the Maryland canals.

	Miles.
From New York to Philadelphia, by the present steamboat route and the Delaware and Raritan canal, the distance is -	108
From Philadelphia to Baltimore, by the Delaware and Chesapeake canal, according to Tanner, is - - -	118
From Baltimore to Georgetown, by the contemplated Maryland canal, by Doctor Howard's report, will be - -	44¾
From Georgetown to Pittsburg, by the Chesapeake and Ohio canal, according to the report of the Board of Internal Improvement, will be - - - - -	341¼
So that the total distance of New York from Pittsburg, by the Delaware and Raritan, the Delaware and Chesapeake, the Maryland, and the Chesapeake and Ohio canals, will be -	612

	Miles.
From New York to Albany, by water, is - - -	145
From Albany to Buffalo, by the Erie canal, is - -	363
From Buffalo to Erie, along the lake, according to Mitchell, is	92
From Erie to Waterford, or French creek, the distance over land is - - - - - - - -	15
From Waterford to Pittsburg, via French creek and the Alleghany river, the distance has not been measured, but is computed to be - - - - - -	172
The total distance being - - - - -	787

The difference of distance, in favor of the southern route, is 175 miles.

The report makes this difference 178 miles, but the distances, before quoted, are corrected, by a late printed statement in Mitchell's Traveller's Guide, and by ascertaining the true length of the Delaware and Raritan canal; so that the water communication, between New York and Philadelphia, is greater than was computed in the text. Tanner makes the distance, by steamboats and the railroad, from Philadelphia to New York, by way of Bordentown, but 91 miles. The Delaware and Raritan canal extends from Bordentown to the lower end of New Brunswick, on the Raritan, and is 43 miles in length. The excess in length of the present northern over the proposed southern route, from New York to Pittsburg, cannot be reduced to less than 175 miles; a distance which exceeds any possible reduction of the former, that can be hereafter effected, by connecting the Genesee and Alleghany rivers; a work, in itself, of great public utility,

since it would not only cut off more than 100 miles of the distance between New York and the head of the Ohio river, by the northern route, but save two transhipments, and the hazard of the lake navigation, as well, in peace, as in war; and, so far, greatly contribute to the value of the Erie canal, in a national, as well as local view.

By the Erie canal and the lake, New York is now distant from Detroit as follows:

	Miles.
From New York to Buffalo, as before stated, - - -	508
From Buffalo to Cleaveland, at the mouth of the Ohio canal,	193
From Cleaveland to Detroit - - - - -	124
Total distance - - - - - - -	825
From New York to Pittsburg, on the contemplated southern route, - - - - - - -	612
From Pittsburg to Cleaveland, by the canal communication, partly executed, by Pennsylvania and Ohio - - -	182¾
From Cleaveland to Detroit, as above stated, - - -	124
From New York to Detroit, by the Maryland canal and the Chesapeake and Ohio canal, the distance will be - -	918¾

The difference in favor of the northern route from New York by Buffalo, is, therefore, 93¾ miles.

But this advantage is more than counterbalanced by the consideration that, added to the difference of climate, which will cause the southern route to be open at least three weeks earlier every spring, and three weeks later every autumn, the lake navigation is free from ice, between Cleaveland and Detroit, a fortnight sooner, after every winter, than it is at Buffalo, and for some distance to the west of the lower extremity of Lake Erie; down to which, the melting ice is borne by the current, and the prevalent winds, at that season.

It is this last consideration, especially, which entitles the port of Cleaveland to a preference over that of Erie, as well as Buffalo, in determining on a permanent route for connecting Pittsburg with Detroit, and the upper lakes.

Should the ports of the District of Columbia, Baltimore, or Norfolk, be able, at any future period, to command an equal capital with New York for foreign and domestic commerce, in addition to the advantage of a warmer latitude, and more constant intercourse with the Ohio and the lakes, they will possess a decisive superiority, in a shorter or less obstructed line of navigation.

From Alexandria, to Detroit, by Pittsburg and Cleaveland, the water communication will be 655 miles; from Baltimore, by the same route and the proposed Maryland canal, 693 miles; and from Norfolk, by the Potomac and the contemplated canals between it and Cleaveland, 856 miles: the distance of the first being less by 170 miles, and of the second by 132 miles, than the length of the most direct route, by water, from New York to Detroit; and although the route from Norfolk, at the lower end of the Chesapeake bay, will exceed that from New York, by 31 miles, this excess is balanced by the advantage of a warmer climate; of equal, if not greater security from foreign invasion; and as ready an access to the Atlantic.

R.

The railroad constructed between Philadelphia and Columbia, on the Susquehannah, is 82 miles long, and has cost $3,595,808 98 cents, to fit it for locomotive engines; to which, if a horse path be provided, the further sum of $34,000 (see the last report of the Canal Commissioners) must be expended, making the entire cost of this road $3,629,808 98 cents, or $44,253 37¾ per mile.

If the Columbia railroad were capable of superseding the use of the Union canal and Schuylkill navigation, then the distance from Philadelphia to Pittsburg would be reduced to 394½ miles: a distance still exceeding that from Washington to Pittsburg by more than fifty miles, and that from Baltimore, should the Maryland canal be hereafter completed, by six miles.

The distance by the Columbia railroad is as follows:	Miles.
Length of the railroad from Philadelphia to Columbia, -	82
Length of the State canal from thence to Hollidaysburg, the point on the Juniata canal where the Alleghany portage commences, - - - - - -	171.75
Length of the portage railroad, across the Alleghany, -	36.75
Length of the western division of the Pennsylvania canal extending along the Conemaugh, Kiskiminitas, and Alleghany, - - - - - - -	104
Being in all, as above stated, - - - -	394.50

In this last distance, the part of the Susquehannah canal, between Columbia and Middletown, 28 miles in length, (see Mitchell's T. G.) and the Columbia railroad of 82 miles, occupy the place of 61 miles of the Schuylkill navigation, and the entire line of the Union canal, in length 80 miles.

Now, the actual outlay of the Liverpool and Manchester Railroad Company, for the entire period which has elapsed since its opening, demonstrates that the mere expense of transportation, on that very perfect road, which a succeeding note, at the close of this appendix, shows to have cost more than £1,080,000 sterling, a sum exceeding, at the present rate of exchange, five millions of dollars, has amounted to six cents per ton per mile for all the merchandise hitherto carried on it; and if the *profit* of the company be added, that the toll and freight, (or expense of carriage,) have together, not fallen short of eight cents a ton per mile.

But the tolls charged by the Union Canal and Lehigh Navigation Company do not exceed, on an average, two cents a ton per mile, on all commodities;* and the cost of trackage, or freight, does not, and certainly will not, hereafter, much, if at all, exceed the half of that sum; making the charge, for both, amount to a moiety only, of the actual expense of transportation, exclusive of any profit whatever, incurred by the Liverpool and Manchester Railroad Company on the most perfect railroad in the world, the mere repairs of which, however, have amounted to near $2,000 a mile for the last year. Hence, the opinion has been hazarded, with little danger of future contradiction, by experience, that the Columbia railroad, and the canal between that town and the mouth of Swatara creek, will not supersede, in the transportation of heavy commodities at least, though thirty

* On coal, it is half a cent, per ton, per mile, on the Pennsylvania State canal; three-fourths of a cent, on the Union canal; and four-fifths of a cent, on the Schuylkill; being one and a half cents per lock, for 32 locks, on 61 miles of navigation.

miles shorter, the use of the water transit of 141 miles, between Philadelphia and the Susquehannah, furnished by the Schuylkill and Union canals. The tolls upon lumber, coal, and lime, charged on these canals, is less than a moiety of the average of the tolls on other commodities; while the freight or cost of trackage is the same on all, because it is proportioned to their actual weight, without regard to their intrinsic value; that weight being the exact measure of the resistance to be overcome, and, consequently, of the cost incurred in their transportation. No allowance, therefore, has been made in the comparison instituted, of the cost of transportation on the Chesapeake and Ohio canal, with that, upon other lines of water communication between the coal fields of the Susquehannah and the Potomac, on account of the shorter distance, from the former, to Philadelphia, by way of the Columbia railroad, than by the canals above mentioned; however preferable that railroad may, and often will prove, for the transportation of persons.

In the preceding remarks on the relative advantages of railroads and canals for the transportation of heavy commodities, nothing is further from the intention of the committee than to underrate the value of the former, or especially of that, the construction of which has been already commenced between Baltimore and Washington, for which the committee promptly reported, without amendment, a bill from the Senate. The memorial of the Baltimore and Ohio Railroad Company, concurring in the petitions of so many of their fellow-citizens, for further aid from Congress to the Chesapeake and Ohio Canal Company, indicates, so unequivocally, the restoration of liberal feelings between those public spirited corporations, as to render it peculiarly improper to institute any invidious comparison in this report, between their respective enterprises, to the prejudice of the former. The committee believe that each has its appropriate use, and that both are entitled, as national works, to the favorable regard of Congress.

It is not only pertinent, however, but required by the occasion which calls for this report, to maintain all the claims which are founded in truth, and which former committees of the House of Representatives have set up, and experience has confirmed, in favor of the Chesapeake and Ohio canal; and hence the allusion in the report itself, and in various parts of this appendix, to the peculiar adaptation of canals to the transportation of heavy and bulky commodities, as well as to the recent confirmation of the hopes early expressed by the friends of this canal, that the speed of transportation on confined or narrow surfaces of water, might be accelerated to a degree not only discredited, but regarded as absolutely impracticable, until the late experiments, with light packet boats, on the canals of Scotland.

S.

The advantages which the Chesapeake and Ohio canal will possess over all other lines of interior communication, north of the Potomac, for the transportation of bituminous as well as anthracite coal, to the towns of the Chesapeake, and the Atlantic seaboard, in general, have been already presented in the views taken of this subject in a prior note (vide O) of this appendix, as well as the report which precedes it, and the fifth annual report of the President and Directors of the Chesapeake and Ohio Canal Company.

It is believed that bituminous coal has been found, nowhere, to the east of the Alleghany, and north of the Potomac, in positions, so favorable for mining and transferring it to the boats which are to transport it to market, as on the valley of that river and of its tributary, George's creek, thirty miles above Cumberland, as well as at intermediate points between them. From similar situations upon the Ohio river, it is raised, and transported, several hundred miles, and delivered from the boats, at six cents per bushel. At Pittsburg and Zanesville it is found on the neighboring hills, transported short distances by land, and delivered into the cellars of the houses of the inhabitants of those towns, for two-thirds of that sum, which is less than the price at which the Duke of Bridgewater contracted with the British Parliament to deliver coals from the Worseley mines, to the citizens of Manchester.

T.

The following extract is from an almanac, printed by a distinguished mathematician, who informs the chairman of the committee that it was transferred without his knowledge to the work from which it is here taken, from the Encyclopedia, article Alexandria.

It is believed to overrate greatly the present production of the Potomac fisheries, but with this explanation is here inserted.

"As Alexandria is the shipping port of the District of Columbia, and one of the principal marts for the immense fisheries of the Potomac, it may be well to mention that in the spring of the year quantities of shad and herring are taken, which may appear almost incredible. The number of shad frequently obtained at a haul is forty thousand and upwards, and of herring vastly more. In the spring of 1832 there were taken in one seine, at one draught, nine hundred and fifty thousand and a little upwards, accurately counted. The prosecution of the numerous fisheries gives employment to a large number of laborers, and affords an opportunity to the poor to lay in, at very reduced prices, food enough to last their families the whole year. The shad and herring of the Potomac are transported by land all over the country, whence there is convenient access to the river, and they are also shipped to various ports in the United States and the West Indies. The lowest prices at which these fish sell when just taken, are twenty five cents per thousand for herring, and one dollar and a half per hundred for shad, but they generally bring higher prices, often one dollar and a half per thousand for the former, and from six to twelve dollars per hundred for the latter. Herring, however, are sometimes taken so plentifully that they are given away, or hauled on the land as manure, for want of purchasers. Some idea may be formed of the importance of these fisheries, from the following statement:

Number of fisheries on the Potomac, about - - -	150
Number of laborers required at the landings, - -	6,500
Number of vessels employed, - - - -	450
Number of men to navigate these vessels, - - -	1,350
Number of shad taken in a good season, which lasts only about five or six weeks, - - - - -	22,500,000
Number of herring, under similar circumstances, -	750,000,000
Quantity of salt required to cure the fish, - -	bushels 995,000
Number of barrels to contain the fish, - - -	995,000

"Should the Chesapeake and Ohio canal be continued to the Ohio river, it is obvious that the fisheries on the Potomac will be of great advantage to the country west of the Alleghany mountains in supplying in great abundance a delicious and valuable article of food, of which its waters are entirely destitute. Taking into view the vast number of fish annually caught, and the probable increase in the demand for them, one might be led to fear that the supply will at length be exhausted, however ample at the present time; but when we reflect that the spawn from an exceedingly small number will generate into myriads and myriads of fish, such a fear is done away."

U.

The autumnal diseases of the Potomac are by no means common to the whole river, which below tide water, as at Georgetown, is remarkable for the salubrity of its climate in autumn as well as at other seasons. Above tide water, which reaches three miles above Georgetown, and below Harper's Ferry, the banks of the Potomac are unhealthy from the last of July until the first hard frost of autumn, their inhabitants being subject for that period to intermittents, and agues and fevers, as on the Susquehannah and Juniata, and it is confidently believed, for the same reason, the great breadth of those rivers in proportion to the depth of their volume of water when reduced by autumnal droughts.

One peculiarity is common to those rivers: it is the growth of several species of grass from their bottoms, the stems and blades of which attain, by the first hot weather of August, a considerable height, and float on the surface of the water. Where this is shoal, and warmed by the action of the autumnal sun, this grass early undergoes a fermentation and decomposition, and emits an offensive odor, very perceptible by travellers, who ford the river at night in the last of August, and throughout the month of September, when the air is damp and still. May not this effluvia be the cause of the ill health of the adjacent shores? In deep water, as opposite to Georgetown and Alexandria, and for a considerable distance above and below these towns, this grass does not appear on the surface of the Potomac, nor does it at Harper's Ferry, in consequence of the rapidity of the current, nor opposite to Shepherdstown, where a dam erected immediately below that town has deepened the water opposite to it.

Similar dams at other places on the Potomac, will have a like effect in destroying this vegetation, or rendering it innocuous, and promoting the health of the adjacent country.

Their effect in multiplying the revenue of the canal, either directly by the sale of water power, or indirectly by attracting the rude materials of the interior to the river shore, for purposes of manufacture, needs no illustration, beyond that afforded by the history of a single manufacturing town of the State of Massachusetts, which has recently sprung up on the banks of the Merrimack river.

As facts appeal more effectually than argument to the common sense of mankind, the subjoined table is annexed, illustrative of the growth and present extent of the manufacturing town of Lowell. The origin of Lowell, the largest manufacturing town in the United States, may be traced to a single canal, at a fall of the Merrimack, which is precisely the same in depth with that of the Potomac, immediately above Georgetown.

STATEMENT of the origin and product, &c., of the Cotton Mills in Lowell, in the State of Massachusetts.

1833.	Merrimack incorporated 1822.	Hamilton incorporated 1825.	Appleton incorporated 1828.	Lowell incorporated 1828.	Suffolk incorporated 1830.	Tremont incorporated 1830.	Lawrence incorporated 1830.	Total.
Capital - -	$1,500,000	$800,000	$500,000	$500,000	$450,000	$500,000	$1,200,000	$5,450,000
No. of mills - -	5	3	2	1	2	2	4	19
of spindles - -	26,000	15,000	9,500	4,000	10,000	10,000	23,000	97,400
of looms - -	1,000	500	350	132	352	410	750	3,494
of females employed -	1,200	700	475	200	475	475	1,050	4,575
of males do -	Including printing 500	Including printing 200	60	Including carpets 175	60	60	100	1,155
Yards made per week -	125,000	70,000	80,000	42,000	90,000	120,000	170,000	*697,000
Bales of cotton used p. week	86	65	86	58	86	86	160	627
Pounds of do do -	30,000	23,000	30,000	20,000	30,000	30,000	56,700	219,700
Yards dyed and printed per week - - - -	125,000	40,000	–	–	–	–	–	165,000
Kinds of goods made -	Printing cloths No. 22 to 40	Drillings and sheeting, printing No. 14 to 40	Sheetings and shirting No. 14	Negro cloths	Drillings No. 14	Sheetings and shirting No. 14	Sheetings and shirting No. 14 to 30	
Tons of anthracite coal used per annum - -	Mills and printing 5,000	Mills and printing 900	200	200	200	200	400	7,100
Cords of wood used per an.	1,400	1,500	100	100	100	100	200	3,500
Gallons of oil used for lighting the factories in winter, and lubricating machinery	6,500	4,000	2,500	3,000	2,500	2,500	5,000	26,000
Diameter of water wheels	30 feet	13 feet	13 feet	13 feet	13 feet	13 feet	17 feet	
Length of do -	24 "	42 "	42 "	42 "	42 "	42 "	54 "	
Commenced operation -	1823	1825	1828	1828	1832	1832	1833	
How warmed - -	Heated air	Steam and heated air	Heated air	Heated air	Heated air	Heated air	Steam	

*36,044,000 *yards per annum*, or 32,607 bales per annum. 21,000 miles. Of the 36 millions of yards of cloth made at Lowell, 8 millions are printed. Including the printed goods which sell at 20 and 28 cents, the whole may be calculated at 10 cents per yard, making $3,604,400, say 3½ millions per annum.

T. H. P.

The thread spun per day would encompass our globe, on the equator, twelve times and upwards.

Average wages of females per week (clear of board) $2, in all the mills.
Average wages of males per day (they board themselves) $1 25.
Total cloth bleached for market, 80,000 yards per week.

Medium produce of a loom per day on No. 14 yarn, 38 to 42 yards; on No. 30 yarn, 25 to 30 yards; No. 14, from 38 to 52 yards per loom per day, depending upon the state of the machinery - - - - - - - - - -	$5,450,000
To the above may be added the	
Middlesex Company, which has erected a long and elegant woollen mill, in addition to their other works, and expends per annum 150 tons anthracite coal, 500 cords hard pine wood, 100 cords oak wood; consumes 490,000 lbs. wool, 10,500 gallons olive oil, 1,450 gallons whale oil, 1,500,000 teasles per annum; employs 60 men at $1 25 per day, (board themselves,) 200 girls at $3 10 per week (board themselves;) operates 64 looms on casimeres, making 900 yards per day; 40 looms on broad cloth, making 250 yards per day; commenced operations with one mill in 1820, new mill 1833; has 2,880 spindles in operation, 21 fulling mills for fulling, and 15 gig mills for warping.—Capital of Middlesex Company - - - - - - - -	500,000
Machine shop, which can prepare machinery for a mill of 5,000 spindles, complete in all its parts, in four months; expends 2,000 lbs. of cast iron, and 1,000 lbs. of wrought iron per day, and employs 200 hands at average wages of $1 30 per day, (they boarding themselves.)—Capital of locks and canals which the Company owns, and machine shop - - - - - -	600,000
The consumption of charcoal in all the works at Lowell may be estimated at 500,000 bushels per annum.	
The Boston railroad will cost a million - - -	1,000,000
This sum is all paid in, with the exception of $300,000 on the unfinished mills in the Lawrence, in all the incorporated Companies,	$7,550,000

Boston, *December*, 1833.

Having taken much pains to procure a correct statement of the operations at Lowell, as above exhibited, I have no doubt of its mathematical correctness.

T. W. PERKINS.

N. B. Two mills are calculated as being complete in the Lawrence, whereas they will not be so till July next.

T. W. P.

The corporation designated as the *Lock and Canal Company*, own all the water and all the land at Lowell, except what they have sold since their purchase; the canal which leads round the falls of the Merrimack, belongs to this company, as does the machine shop, public hotel, and other buildings used in a variety of ways. For the canal which furnishes the water power, the company paid $60,000; they have since taken water into another canal, which they have excavated from the great canal, and the Lawrence, Tremont, and Suffolk Corporations are on the new canal. The fall of the Merrimack is about thirty-seven feet.

It is supposed there is yet unimproved water power equal to, at least, one-half of that now in use. The stock of the locks and canals is divided into 1,000 shares, of $500 each share, making half a million of capital. About 250 acres of the 600 purchased, have been sold, or taken for streets; land has been sold, in very favorite situations, as high as one dollar twenty-five cents per square foot, though the general price of land, in the settled part of the village, is from twenty-five to fifty cents per foot. The price of shares in this company, at this time, is $1,300 per share; though there are few sellers at that price. The Lock and Canal Company, owning the machine shop, have generally furnished all the machinery for the manufactories. When the purchase of the land was made by the company, there were not a hundred souls upon it; at the present time, the population is supposed to be nearly if not quite 15,000. There are five churches, two banks, and a large trade is carried on by the trading people, who are numerous. All the goods made at Lowell are sold by the Boston agents, even when wanted for the shops at Lowell, the company discouraging any sales but through the regular salesmen, who reside in Boston. There is a railroad now erecting from Boston to Lowell, about twenty-four miles long, which will be finished the next year, and will, probably, be the best road in the country, being laid the whole length in granite, with the edge rail upon it. It is thought the double track, with cars, locomotives, &c. will cost a million of dollars; of which the locks and canals pay $100,000 as a bonus to the stockholders of the railroad.

T. H. PERKINS.

For the preceding table and interesting statements, the chairman of the committee is indebted to the highly respected, very intelligent, and public spirited contributor to all the useful and benevolent enterprises of the State of Massachusetts.

V.

It requires no stretch of fancy, to imagine that, by laying a light railway on the berm or guard bank of this broad canal, and, where the latter is interrupted by cliffs of rock or the interposition of locks, extending the rails on a scaffolding sustained by piles driven in the earth, or posts standing on the bottom of the canal, so as to pass along the base of those cliffs, and around the several locks, steam may be made to supersede altogether the use of animal labor, in the transportation of persons; without either contracting the width of the canal or obstructing the present towpath, which should always remain open, for the trackage of freight boats, in the usual mode, or, if it be the pleasure of their proprietor, of packet boats also.

By supplying the packet boat with runners, when the canal shall be frozen too hard to be kept open for navigation, at a reasonable expense, as

is done in Scotland, may it not be practicable to continue such mode of transportation throughout the severest season of every winter, and to extend the application of steam as a propelling force, from the packet to the freight boat, and thus to provide for the transportation of commodities, as well as persons, throughout the year?

A direct application of the principles recently developed, in the use of swift packet boats on the British canals, naturally, if not unavoidably, prompts these suggestions. It is very probable, if not absolutely certain, that by means of a locomotive engine, of moderate power, running on a perfectly level surface, elevated, as is the guard bank of a canal, above the surface of its water, and the plane of motion of the boat, and enabled, when necessary, to ascend the elevation of a few feet at each lock, by the fall of water from the level next above, a much augmented velocity might be attained, without the slightest injury to the banks, or the least interference with the freight boats of this wide canal.

No principle of sound philosophy has been disproved, it may be asserted, by the success, which, every where, attends the introduction upon canals of swift passage boats, drawn by horses, without occasioning a wave in front, or any surge behind, at the rate of twelve miles an hour. The resistance of such a boat at its highest velocity, may be still demonstrable by experiment, when its motion *is less than six miles an hour*, to be as the square of its velocity, since it is that very velocity, which, when much augmented, elevates, by its projectile force, the centre of gravity of the boat, to a plane, above the surface of the resisting fluid; and thus causes the resistance of that fluid to be proportionably diminished. This resistance may, therefore, continue to be, as the square of that velocity, when the boat is at its highest speed. At a speed, *below six miles an hour*, the gravity of the boat retains its full effect, in displacing a quantity of the water of the canal, as it proceeds, equal, in weight, to the boat and its cargo; and the theorem of Dubuat, founded on repeated experiments, on the canals of France, as well as on the prior reasoning of Bossut and D'Alembert, may remain uncontroverted. The only surprise, which this modern discovery would awaken in that case, would be, that these celebrated mathematicians had not pushed their experiments on the moving boat, beyond that velocity, the laws of which, within certain limits, they have correctly assigned.

It is not improbable, at least the opinion may be hazarded without the imputation of credulity, that, if the power which produces the accelerated velocity were exerted within the boat, and not upon a plane elevated above it, several feet; if it were placed, as on the common steamboat, and made to operate in, and not above, the plane of its centre of gravity, when at rest, or were the power supplied by the external action of the wind upon sails attached to a mast erected at the same point in the boat, any increase of its velocity might only tend to immerse the boat still deeper in the water, instead of raising it towards the surface. In this event, the resistance of the boat, at the highest attainable speed, would much exceed on any canal, the ratio laid down by those eminent philosophers.

The following extract from a Glasgow newspaper affords, in detail, with other pertinent and valuable information, the facts in relation to this subject, stated in the text of the report:

"Three years' experience on the Paisley canal has proved that passengers can be conveyed along canals, in light boats, and roomy and comfortable cabins, at the rate of ten miles an hour, without damage to the canal

banks, at fares of one penny per mile in the best cabin, and three farthings per mile in the steerage. Let these fares be compared with the expense of carrying passengers on the Liverpool and Manchester railway. The fares in the best railway coaches are nearly three times as much as those in the best cabin of the canal boats; and the very lowest fare on the railway, at a much reduced speed, is three halfpence per mile, in an open and uncovered wagon, exposed to wind and rain, and the steam and smoke of the engine. This is just *double* the fare in a covered cabin by the canal boats, going at the rate of ten miles an hour.

"It must not be imagined that such an excess in the expense of railway travelling goes into the pockets of the railway proprietors, for such is not the fact. By the latest report of the Manchester and Liverpool Company, the carriage of *each* passenger costs the Railway Company themselves 2*s.* 10½*d.* for a distance of thirty miles. This alone amounts to upwards of one penny per mile before the Railway Company get any return for the use of the railway. The *bare outlay* on the railway is, indeed, nearly fifty per cent. higher than the *total fare* on the canal. A short calculation will make this evident:

"The average outlay, in conveying each passenger by the railway, is the above sum of 2*s.* 10½*d.* for 30 miles, which is per mile, 1*d.* 3-20ths.

The proportions of best cabin and second cabin passengers, on the Paisley canal, one-fifth of best cabin passengers, at 1*d.* per mile, and two-fifths of second cabin passengers, at three farthings per mile. The average total fare on the canal is, therefore, 16-20ths of a penny per mile, 0*d.* 16-20ths, being seven-twentieths of a penny per mile, or very nearly fifty per cent. less than the bare outlay on the railway. The canal companies can thus afford to carry, and actually do carry, passengers at the speed of ten miles an hour, at rates that would be not only unprofitable, but actually ruinous to railway companies.

"But, moreover, the expense to the Railway Company of carrying passengers has, according to the reports of the directors, been regularly increasing; whereas the expense to the Canal Company has been regularly decreasing.

"The natural consequence of these facts has been the progressive falling away of passengers on the Liverpool railway, and the progressive increase of passengers by the Paisley canal, as will appear from the following table, showing the average number of daily passengers on the railway and on the canal:

	Railway.	*Canal.*
Average number daily in 1831,	1,297	258
Do. in 1832,	977	476
Do. in first six months of 1833,	947	687

"Being a *decrease* of 300 in the average daily number on the railway, and an *increase* of 429 in the average daily number on the canal.

"The increase of passengers, by similar swift boats lately established on the Preston, Lancaster, and Kendal, and Forth and Clyde, and Union canals, has been equally rapid, or rather more so; and on the Paisley canal, during the months of July and August, the daily average was upwards of 1,000 passengers.

"This result is not attributable merely to an increase in the number of boats, but in a great measure to the fact of the boats being better filled in consequence of the increased comfort, speed, and economy of canal convey-

ance, as will appear from the following table of the average numbers of passengers on each trip on the Paisley canal:

During 1830,	4	trips daily,	25	passengers each	trip.
1831,	8	do	32	do	do
1832,	14	do	34	do	do
During the first six months of 1833,	18	do	45	do	do

"These light and swift iron passage boats have not yet been established on the different canals, and river navigations, between Liverpool and Manchester. When this takes place, the progressive decrease of passengers by that railway will assuredly go on more rapidly than ever, and the question between railway and canal conveyance will be settled beyond all doubt or dispute."

W.

The administration of the fiscal affairs of the company has been conducted in such a manner as to preclude fraud or mismanagement in the collection and disbursement of its funds.

Not one cent, it is believed, has been lost or misapplied, of the several millions which have been collected and paid out. All sums are paid to the Canal Company through some one of several selected banks. The receipts passed by the treasurer are given, not for money, but in exchange for a certificate of the cashier of some one of certain specified banks, that the other debtor of the Canal Company has deposited a certain amount to the credit of the company, so that the accounts of the several banks check those of the treasurer. No money is paid out by the treasurer, but in virtue of an appropriation made by order of a majority of a board of not less than four directors, and every requisition or authority for such payment, must, moreover, be subscribed by the President of the company, the clerk, and the treasurer. The two last named officers keep distinct and regular accounts of all disbursements, and an error in the books of the one, which has, however, never occurred, could not fail of being detected by a recurrence to those of the other officer. Each requisition is numbered, and bears on its face the head of expenditure to which it appertains, and is entered accordingly in the books of those officers. Hence, it is easy to ascertain, and the monthly reports of the treasurer to the Board of Directors faithfully and minutely detail, the amount expended, under each head.

The payments for the construction of the canal are made each month, and grounded on monthly estimates returned to the Board by the several resident engineers, of the work done by each contractor on each section, lock, aqueduct, culvert, or other separate work, in the past month. These estimates are required to be subscribed by the resident engineer, and countersigned by his assistant, and to state the quantity and price, according to contract, of each species of work done, as of excavation, grubbing, embankment, walling, &c. Before the estimates are paid, they are verified by a comparison, made by the clerk in the canal office, of the sum allowed in each estimate for each species of work, with the actual terms of the contracts for its execution, of which duplicate copies are kept in this office, and the office of each resident engineer, who also keeps a minute account of each estimate returned by him, and of the total cost of such work in his residency. Moreover, the whole are compared with the weekly reports made by the same engineers to the office in Washington, of the number of men and boys, and beasts of labor employed on the several species of work.

These tabular reports descend to the minutiæ of reporting the number of each description of laborers fit or unfit for duty, distinguishing their respective employment by the implements of labor used by them, as drills, scrapers, wheelbarrows, carts, and wagons. The number is thus ascertained of each class engaged in boring and blasting rock, and the pounds of gunpowder consumed in the week: and as the wages of the laborers make part of the report, these reports afford a check upon the engineers as well as contractors, and disclose the progress of each work, calling for great despatch.

The contracts, except in a few special cases, have been made after due notice by public advertisement, or on the printed proposals of the several contractors, in the presence, and by the agency of the whole Board of Directors. They are preceded, in each case, by a careful examination and measurement, and an exact estimate on the ground, by the resident or chief engineer, of the quantities and value of the various descriptions of work to be done; and no extra allowance to any contractor has been made for some time past, because he may have made an indiscreet or losing bargain.

Twenty per cent. is retained by the Canal Company, out of each monthly estimate, till the contractor has completed his work. In the interim, he may abandon it whenever he pleases, with no other loss than of the retained money. In all cases of neglect or unreasonable delay, certified by the acting resident engineer, the President of the company is authorized, by the contract, to vacate and relet the work, but is not allowed to increase the compensation of the new contractor, in any case, without express authority from the Board of Directors.

The President is the chief executive officer of the company, supervises in person the conduct of all the engineers, agents, and contractors, collectors, and lock-keepers of the company; inspects, periodically, and as often as practicable, the various works under contract, and the canal in use, and the offices of the engineers, clerk, &c., and recommends to the Board, from time to time, such measures as he deems expedient, or calculated to promote, in any manner, the interests of the company: but the funds of the company never come into his hands. The treasurer, and the treasurer only, under the checks which have been stated, is the receiving and disbursing officer.

Such is the system of administration, devised, and steadily adhered to, by the company; and, under it, the Chesapeake and Ohio canal has been so far conducted without the misapplication of one cent of its large expenditure.

Y.

[The following note is designed to explain the facts stated on the forty-first page of the report relative to the Liverpool and Manchester railroad, but the letter of reference was accidentally omitted in the text.]

It will not be inferred from these abstracts from the reports of the Liverpool and Manchester Railroad Company, that 40,134 tons of coal, and 98,247 tons of merchandise, afford any measure of consumption of fuel or the trade of either of those towns. The Mersey and Irwell navigation, and the Bridgewater canal, furnish other channels of communication between them.

In the last semi-annual report of the Directors of the Liverpool and Manchester railroad, dated the 23d of January, 1834, they remark that "the present winter has been, in an extraordinary degree, stormy and wet; which has, no doubt, diminished the amount of travelling." And

further, that "the wetness of the season, also, has prevented the railway from being maintained, in that complete order, which is desirable: while the boisterous weather, with the dirty state of the rails, has impeded the passage of the trains, not unfrequently rendering assistant engines necessary to ensure their progress, even on the level parts of the way. These circumstances have unavoidably increased the charge for locomotive power." On the other hand, says the report, "the navigation of the river, owing to the long continuance of tempestuous weather, being frequently *dangerous* and sometimes *impracticable*, the utility and importance of the railway conveyance have become more manifest and striking, and the natural consequence has been, an accession of traffic to the company, proportioned to the required accommodation afforded the public."

This statement of the directors cannot well be understood, without recollecting that the river Mersey here alluded to, constitutes, for sixteen miles next to Liverpool, a part of each of the two water communications between Liverpool and Manchester, called the Bridgewater canal, and the Mersey and Irwell navigation, which latter, above Runcorn, is made up of short canals, locks, dams, and pools.

The Bridgewater canal, being private property, no account of its annual receipts and disbursements is ever made public. It is believed to be one of the most profitable canals in England.

The dividends on the stock of the Mersey and Irwell Navigation Company, for the last year, was what, with but one remote exception, it has been for many years, forty per cent.: and in the late British trade lists, the price of its stock is weekly quoted "at from £680 to £705 the share of £100, and recently at £725. In 1831, the market price of this stock was reduced to £525 the share, in consequence of the panic produced by the asserted superiority of railroads to canals.

Whatever benefit the Liverpool and Manchester railroad may have derived, from the increase of its business, it has obviously not been acquired, at the expense of this rival channel of intercourse between the cities which they unite, and to the prosperity of which, they both, doubtless, very greatly contribute; for the stock of the railroad is, also, quoted in the same trade list at £205 the share of £100. The tonnage of the vessels engaged in the trade of Liverpool in 1819, exceeded 867,000 tons, and Manchester is not only the largest inland manufacturing town in Great Britain, but the centre of one of the most populous and flourishing manufacturing districts in Europe. Its consumption of coals, to which the Liverpool and Manchester railroad supplied 7,830 tons, only, in the last half year, must require annually many hundred thousand tons.

The following table, extracted from the last report of the directors of this road, will serve to illustrate the sources of revenue of this the most costly, as well as the most profitable railroad in the world. In another part of the same report, the maintenance of the way, by which is meant the repair of the road, is distinguished from all other annual charges, and extended for the last half year, at £6,425 14*s.* 8*d.* the double of which is £12,851 9*s.* 4*d.*, for the year, or near $2,000 per mile. The number of engineers, clerks, agents, overlookers, and workmen, receiving salaries, or days wages, in the service of the company, for the week ending with the half year which expired on the 31st of December, 1833, was 739: of which, sixty-four were agents, clerks, and overlookers. The length of the road is so near thirty miles, that all the calculations of the company, requiring a computation of its length, assume it to be thirty miles.

Disbursements apportioned under the different heads of expenditure, in the corresponding six months of the last year, say, from 1st July to 31st December, 1832, on the Liverpool and Manchester railroad.

	Per passenger booked.	Pr. ton of merchandise, Liverpool & Manc.	Per ton of coal.	Per ton on Bolton tonnage.	Coaching department.	Merchandise department.	Coal department.	Bolton tonnage.	Totals.
	s. d.	s. d.	s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Disbursements in the merchandise department, consisting of porterage, salaries, carting, stationary engine, &c. disbursements	–	3 5	–	0 2¼	– –	11,593 4 9	– –	184 19 8	11,778 4 5
Disbursements in the coaching department, comprising porterage, salaries, repairs, duty on passengers, &c.	0 6¾	–	–	–	5,102 18 10	– –	– –	– –	5,102 18 10
Porterage, &c. in the coal department, after deducting amount received for weighing coal	–	–	0 0¼	–	– –	– –	27 2 10	– –	27 2 10
Locomotive power account, proportioned according to the number of trips of thirty miles in each department, comprising repairs of engines, wages, coke, &c.	0 10¾	1 2¼	*1 1¼	–	8,096 8 4	4,042 3 7	507 17 9	– –	12,646 9 8
Sundry disbursements, proportioned according to the receipts as between the coaching and merchandise departments, and according to the number of tons and miles conveyed, as between the Liverpool and Manchester, and Bolton trade, comprising maintenance of way, police, and gate establishment, general office establishment, &c.	0 6½	1 0	0 2	0 8	5,030 4 10	3,444 7 4	327 2 5	635 19 9	9,437 14 4
Rates and taxes, interest on loans, and chief rents, proportioned according to the amount of profit in each department, calculated *exclusively* of these items of disbursement	0 7¼	0 11¼	0 2½	0 1¾	5,515 1 1	3,197 4 8	430 5 10	143 7 2	9,285 18 9
Total disbursements	2 7¼	6 6½	*0 7¾	1 0	23,744 13 1	22,277 0 4	1,292 8 10	964 6 7	48,278 8 10
Nett profit	2 1¼	3 3¾	0 9	0 7	19,375 13 10	11,232 12 6	1,511 14 6	503 13 2	32,623 14 0
Gross receipts	4 8½	9 10¼	1 4¾	1 7	43,120 6 11	33,509 12 10	2,804 3 4	1,467 19 9	80,902 2 10

* As the charge for locomotive power was incurred only on about one-fourth of the quantity of coal on which tonnage is charged, the total disbursements per ton on the whole quantity will not correspond with the addition of this column.

STATEMENT OF RECEIPTS AND EXPENDITURE ON CAPITAL ACCOUNT,

From the commencement of the undertaking to 31st December, 1833.

Treasurer, Dr.	£	s.	d.
To amount of joint capital in shares and loans - -	1,086,885	0	0
Ditto of dividends not paid - - - - - -	1,087	3	1
Surplus in hand after payment of the 6th dividend, in August, 1833 - - - - - - - -	395	10	2
Nett profit of the concern for the half year ending 31st December, 1833 - - - - - - - -	40,884	8	4
	£1,129,252	1	7

Treasurer, Cr.	£	s.	d.
By amount of expenditure on the construction of the way and the works, including the tunnel excavation, &c. now in progress - - - - - - - -	1,089,818	17	7
Ditto in the hands of Moss & Co. bankers - - -	28,476	11	9
Ditto in the hands of the treasurer - - - -	242	15	9
Ditto of arrears on calls - - - - - -	25	3	6
Ditto balance of book debts due to the company - -	10,688	13	0
	£1,129,252	1	7

The proprietors are aware that the subject of locomotive engines has always been one of great interest and importance. The charge under this head continues very heavy, arising, in a great measure, from the necessity of renewing and strengthening the frame work of the machinery, and from the purchase of copper and brass plates for the renewal of fire-boxes and tubes.

The charge for coke has been a heavy item in the locomotive expenditure, amounting to nearly £6,000 per annum. The directors have lately been induced to try gas coke to a very considerable extent. The cost per ton is less than one-half the cost of Worsley coke; and although a greater weight is required to do the same service, and an extra consumption of fire-bars and some other difficulties attend the use of it, the directors have considered the experiment well worth making, in the hope of diminishing the expenditure in that department.

Several new schemes for an improved locomotive power have lately been brought under the consideration of the directors. Past experience forbids any very sanguine anticipations of success in respect of untried speculations; at the same time, the directors will not fail impartially to investigate the pretensions of any scheme from a respectable source, which professes to introduce improvement into so important a branch of the company's establishment.

The charge for the maintenance of the way is another heavy item of the current expenditure. In particular parts of the road, especially on the descending lines of the inclined planes, the rails prove too weak for the heavy engines, and the great speed at which they are moved; and from the breakages which have taken place, the directors have thought it expedient to order a supply of stronger and heavier rails, to put down in those districts where the present rails have been found insufficient. This proceeding will, in the first instance, subject the company to some increased expenditure. The directors, however, have contracted (for the ensuing year) for that portion of the maintenance of way which consists of labor and small materials, on terms of comparative advantage to the company, which they expect will balance the increased outlay required for the purchase of stronger rails.

Z.

In the reports to the House of Representatives of 1827 and 1828, which accompanied the bill authorizing the subscription of ten thousand shares to the stock of the Chesapeake and Ohio canal, the committee expressly stated that, "it is on the supply of mineral coal that the committee chiefly rely, in indulging the confident expectation of very great profit on the stock of the Chesapeake and Ohio Canal Company. Sufficient space is not allowed, in a report already too far extended, to manifest all the grounds of this confidence. They are derived from a comparison of the well known quality of the Potomac coal, with that which is furnished by the other rivers of the United States; from the comparative facilities of reaching the elevated banks which supply it, by the canal boats; and from a consideration of the various and multiplied uses to which it is applicable.

"If the District of Columbia, the States of Maryland and Virginia, the river Potomac, or the shores of the Chesapeake, shall hereafter rear a city of but secondary rank, or all their cities together shall be equivalent to but one such emporium of arts and commerce; if this emporium shall not surpass the single city of Glasgow, in Scotland; the future profit accruing to the Chesapeake and Ohio Company, from coal alone, will reach the *maximum* income, limited by its charter, as the following extract from a work of unquestioned authority will clearly demonstrate.

"'In the suburbs of Glasgow, there are *eighteen collieries* containing fifty-eight engines, amounting in all to 1,411 horse power.

"'Taking the average of three years, ending the 31st of December, 1824, *exclusive of what came from the suburbs*, 1,690,653 tons of coal were brought, annually, to Glasgow, by the Monkland canal.' The tonnage of this canal, at three cents toll a bushel for its coal, would amount to $1,420,148 43, or near a million and a half of dollars.

"On the 11th of April, 1825, there were in Glasgow 176 engines used in manufactures, amounting, in the whole, to 2,970 horse power, average of engines $16\frac{275}{1000}$ horse power.

"'The first boat propelled by steam, in Europe, was made in Glasgow. It began to ply on the Clyde, in January, 1812. On the 11th of April, 1825, there were fifty-three steamboats plying on the Clyde, containing sixty-eight engines, amounting to 1,936 horse power.' Total steam power, viz. engines in Glasgow and on the river Clyde, 244, equivalent to the power of 4,906 horses.

"'The population of Glasgow, in 1801, was 83,769; in 1821, 147,043. The population of the suburb parishes of Barony and Gorbals, is included in these estimates. The Royalty alone contained, in the last year, 72,765 souls.'*

"Throughout Great Britain coal is generally found, not on the sides of mountains, as along the Potomac, but beneath, and sometimes very far below the surface of the country, as on James river, in Virginia. It is, consequently, brought to the surface there, by the application of great power, and at heavy cost. Almost as much labor is exerted in pumping water from the mine, and in raising the rock and earth loosened in excavation, as in elevating the coal to the surface of the earth; and the health

* Sinclair's Analysis of the Statistical Account of Scotland.

of the laborers, immured in sulphureous and damp pits, while getting it, is exposed to a danger, which will not be encountered on the banks of the Potomac. Some estimate of this advantage of the Potomac coal mines, over coal pits, so circumstanced, may be formed, from the fact, that the bushel of coal now costs at the summit of the shafts sunk near the James river, considerably more than the computed expense of raising and transporting it to the markets of the Potomac, exclusive of toll. Every branch of American manufacture is destined, hereafter, to experience this advantage, in a competition with Great Britain, for the supply, not only of American consumption, but of that of all other nations. Great Britain owes her superiority, in manufactures, eminently, to her abundant mines of this valuable mineral; and that nation which shall hereafter obtain it, on the cheapest terms, all other circumstances being alike, must surpass her in the mechanic arts, as she has hitherto done the rest of the world.

"*Prices of Coal in Philadelphia, from* 1818 *to* 1825, *inclusive.*

1818.	Foreign coal, Liverpool, - - -	30 cts. per bushel.
	Do. Newcastle, - - -	35
	Virginia, - - - - -	31
	Pennsylvania, - - - -	50
1819.	The same of the whole.	
1820.	The same, excepting Pennsylvania, -	30
1821.	Foreign coal, - - - -	30 *a* 35
	Virginia, - - - - -	28 *a* 30
	Pennsylvania, - - - -	30 *a* 35
1822.	Do. - - - -	" "
	Foreign, - - - - -	28 *a* 35
1823.	Do. - - - - -	30 *a* 33
	Virginia, - - - - -	25 *a* 28
	Pennsylvania, - - - -	25 *a* 30
1824.	Do. - - - - -	23 *a* 35
	Virginia, - - - - -	20 *a* 28
	Foreign, - - - - -	30 *a* 33
1825.	The same as 1824.	

"Owing to the season being far advanced when the Schuylkill navigation was completed, and the dryness of the season, there was less Pennsylvania coal brought to market than was expected. The price has, of course, risen since the beginning of winter. The general expectation is, however, that there will be a plentiful supply next summer and fall, from the Lehigh and Schuylkill mines, and that the price will not exceed twenty cents per bushel, or five dollars and sixty cents per ton, of twenty-eight bushels.

"The preceding table and statement were supplied to the Central Committee of the Chesapeake and Ohio canal, by a member of the Senate of Pennsylvania.

"The price of coals on the James river, and the cost of Virginia and Pennsylvania coal for a series of years, in Washington, will be found in the annexed information from a resident merchant in Washington, and a dealer in that commodity.

"'*Estimate of the prices at which the Virginia coal, brought from Richmond, has been sold, for the last five years, or from* 1821, *to* 1826.

"'Price of coal in Richmond, in 1821, from fourteen to twenty cents per bushel of four pecks; depending entirely upon quality. The coal on the south side of James river, has generally been esteemed the best, and has generally commanded from four to six cents per bushel more than that on the north side.

"'The same coals have generally been sold in this market at from twenty-five to thirty-three cents per bushel, agreeably to the standard measurement of this District, which is about ten or twelve per cent. more than that in Richmond.

"'Since my residence in this city, which has been for the last five years, there has been but little or no fluctuation in the above prices; and, if any, they have been gradually declining; owing, I think, in the main, to wood having been sold within the last few years cheaper than formerly, and in some measure to the Lehigh and Susquehannah stone coal having been introduced here within the last two years, which is preferred by some people. There has also been, within the last two years, from 10 to 12,000 bushels or more of the pit coal brought from Cumberland, on the Potomac, to this place, which, I think, in point of quality, superior to any pit coal I ever saw, and it has sold at from twenty-eight to thirty cents per bushel by this measurement. The Lehigh and Susquehannah coal, which is a hard stone coal, sells for eight to nine dollars per ton, equal to twenty-eight bushels to the ton. The estimate generally made of the consumption of coal for a fireplace for the winter, is fifty bushels. I would, myself, consider seventy-five bushels not too much for the season in this climate, when fire would be at least agreeable, if not necessary.

"'WASHINGTON CITY, *May* 24, 1826.'

"When the boats of the Chesapeake and Ohio canal shall reach the coal banks on the Potomac, it is believed that coals can be put on board at one cent a bushel, which is more than the price now paid for loading the coal wagons, at the banks near Pittsburg.

"From the enlarged dimensions of the Chesapeake and Ohio canal, designed, as has been seen in a former note, to give to the boats the advantage of moving as on an indefinite expanse of water, the freight cannot be computed at more than four, or, at most, five cents the bushel. The tolls charged on this commodity, in the early operations of the canal, will be required to be large, in order to yield a sufficient income upon the stock of the canal: they will, of course, be reduced when the resources of the country through which the canal passes, and the territories which it is designed to unite, shall be fully developed. If the toll, for the first years, be computed at six and a quarter cents the bushel, then the price of the commodity in the District of Columbia will be twelve and a half cents, exclusive of the mercantile profit of the dealer, which may make it fourteen cents.

"On various parts of the line of the canal, it will be much lower. At Pittsburg, coal is delivered into the cellars of the houses of the inhabitants, after transportation from the neighboring mines, distant from one to five miles, at three cents the bushel.

"The heat supplied by the Pittsburg coal, to that of wood, is deemed

to be in the ratio of seventeen bushels to a cord of dry hickory. The specific gravity of the coal of Pittsburg is heavier than that of Liverpool. 'In a manufactory at the former, 3,000 spindles are moved during the day of twelve running hours, equivalent to thirteen and a quarter hours, with sixty bushels of coal, which, at the same time, warms the houses and factories. By the arks, or rude boats, which descend the Ohio and never return, it is delivered at Louisville, after a voyage of 550 miles, accelerated by the freshes of the spring and autumn, for from six to eight cents the bushel.'

"The price of coal at the great manufacturing town of Manchester, in England, is three and a half pence sterling (equivalent to about six and a third cents, when reduced to American currency at par) the bushel, of six score, or one hundred and twenty pounds weight, which is equal to one and a half of Pennsylvania. The price of coal at Manchester is, therefore, near fifty per cent. higher than at Pittsburg. At Liverpool, it is still higher. At the coal banks upon the Potomac, it will be as cheap as at those near Pittsburg, where it is put in the wagon at less than a cent a bushel. Coal is now delivered at the manufactories of Zanesville, on the Muskingum, at two and a half cents the bushel. In a manufactory of window glass in that town, seventy thousand bushels are annually consumed at that cost.

"New Jersey and New York are both looking to Pennsylvania for a supply of this mineral. The former expects to obtain it by a canal from the mouth of the Lehigh: the latter by the Hudson and Delaware canal.

"The following extract of a letter, dated Philadelphia, January 28, 1826, from a gentleman extensively engaged in the coal trade of Philadelphia, furnishes valuable information upon this subject:

" 'I have great pleasure in answering the queries submitted by you respecting the coal trade; my observations, you will observe, apply only to the mines at the head of the Schuylkill, and the improvements on that river; not having it in my power to give you information as to any other.

" 'The works are in extent about one hundred and eight miles, commencing at the Lancaster Schuylkill bridge, and ending at Mount Carbon, of which sixty-two miles are by canals, and forty-six by pools in the river. The number of houses for lock-keepers is sixty-five, the number of locks below Reading thirty-nine, and above Reading eighty-one, being, in the whole, one hundred and twenty; of which twenty-eight are guard locks, overcoming a fall of five hundred and eighty-eight feet; deducting the twenty-eight guard locks, leave ninety-two, which give an average of about six feet five inches lift to each lock; they are seventeen feet by seventy-five, and the time required in passing a loaded boat, is from six to eight minutes.

" 'The cost of the coal on board the boats is a difficult question precisely to answer: the situation of the bed or vein, its thickness, the purity of it, whether intermixed with veins of slate and dirt, whether taken out by a drift or shaft, whether troubled with water, &c. &c., are matters that are to be taken into consideration. As far as my experience goes, I think that from two to four cents is the cost of raising it to the pit's mouth. No improvement whatever has yet been made in transporting it to the landing, the common two-horse wagons of the country, carrying about thirty bushels, are still in use; the present expense of hauling may be estimated at one cent per bushel per mile. Suppose, then, the coal to be

raised at an average of three cents from a mine two miles from the landing, it may be delivered on board the boats for five cents per bushel.

"'In consequence of the small number of boats on the canal during the last season, and the great demand for them, we were obliged to pay as high as seven cents per bushel, freight, from Mount Carbon. The toll is six cents, or one dollar and sixty-eight cents per ton of twenty-eight bushels. The cost of delivering it in Philadelphia, the last year, may, therefore, be estimated as follows:

At the pit's mouth, - - - -	3 cts. per bushel.
Hauling two miles, - - - -	2
Freight, - - - - -	7
Toll, - - - - - -	6
Interest on cost of land and capital employed, salary to agent, &c. &c., at least, - -	2
	20 cts.

"'When the business is carried on by the companies or individuals possessing large capitals, (which, no doubt, will be the case,) and with all the advantages of railroads, steam engines for raising the water, wagons particularly calculated for the purpose, and other improvements in use in the collieries in England, it will, of course, be delivered at a much cheaper rate. It is supposed that, when the towpaths are complete, and those engaged in navigating the boats more experienced, the freight will not be more than four cents; last season, in consequence of the towpaths not being finished, it required fourteen days for a boat to come down and return; hereafter it may be done in eight or nine. From present experience, flat bottom boats, carrying about twenty-five tons, or seven hundred bushels, eight to nine feet beam, sixty feet long, and drawing, when loaded, about two feet six inches, are preferred; two men, a boy, and a horse, are required to navigate them, and 'it is a fact worthy of notice, that a horse towing a boat, will, with greater ease, go at the rate of four miles an hour in a pool, than three miles in a canal.'

"'The veins of coal in Schuylkill county, with but few exceptions, dip nearly north and south, at an angle of forty-five, or thereabouts, and run about E. N. E. and W. S. W.; they vary in thickness, but generally are from four to six feet, many are found less, and some of ten and eleven feet thickness; if less than four, they are not considered profitable to work; a stratum of slate is always found above and below the coal. A few veins are found near the head of navigation, but the larger and more valuable lie at a distance of from one and a half to four miles.

"'PHILADELPHIA, *January* 28, 1826.

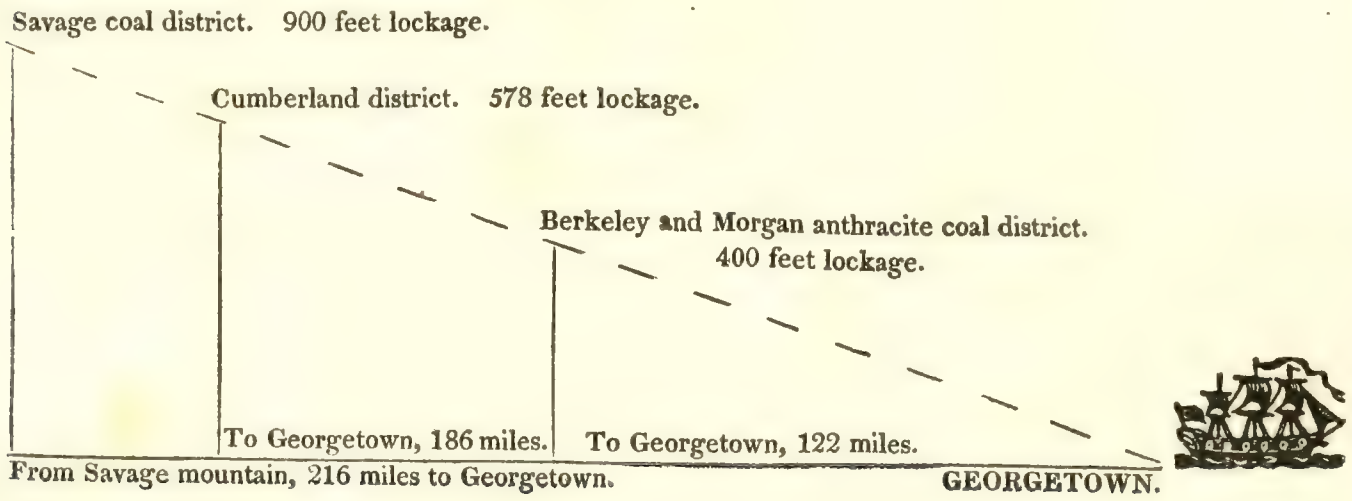
"'P. S. The price of coal last season, was $7 33 per ton, until the month of December, when, owing to a short supply, it was sold as high as $10 50.'

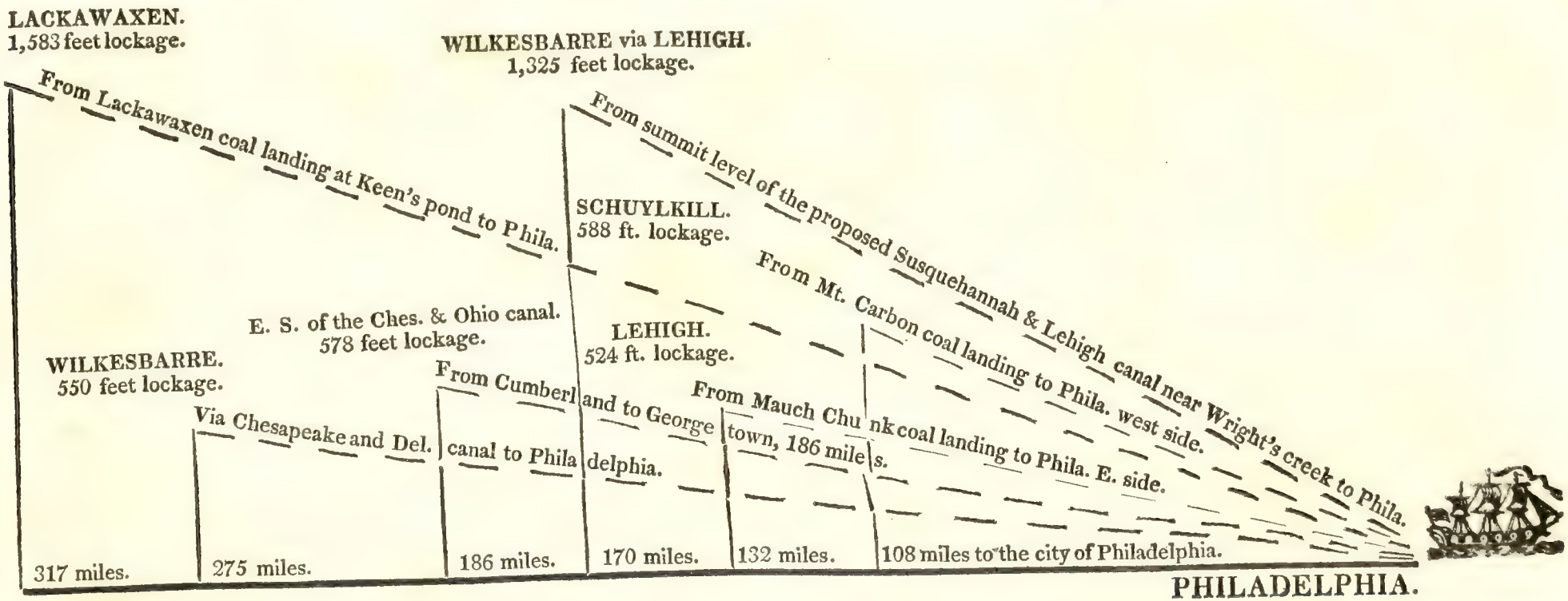
"The subjoined table (page 255,) 'of the comparative heights and distances of the principal districts of anthracite coal in Pennsylvania from market,' is from the last report (of December, 1826) of the engineers of the Lehigh Coal and Navigation Company.

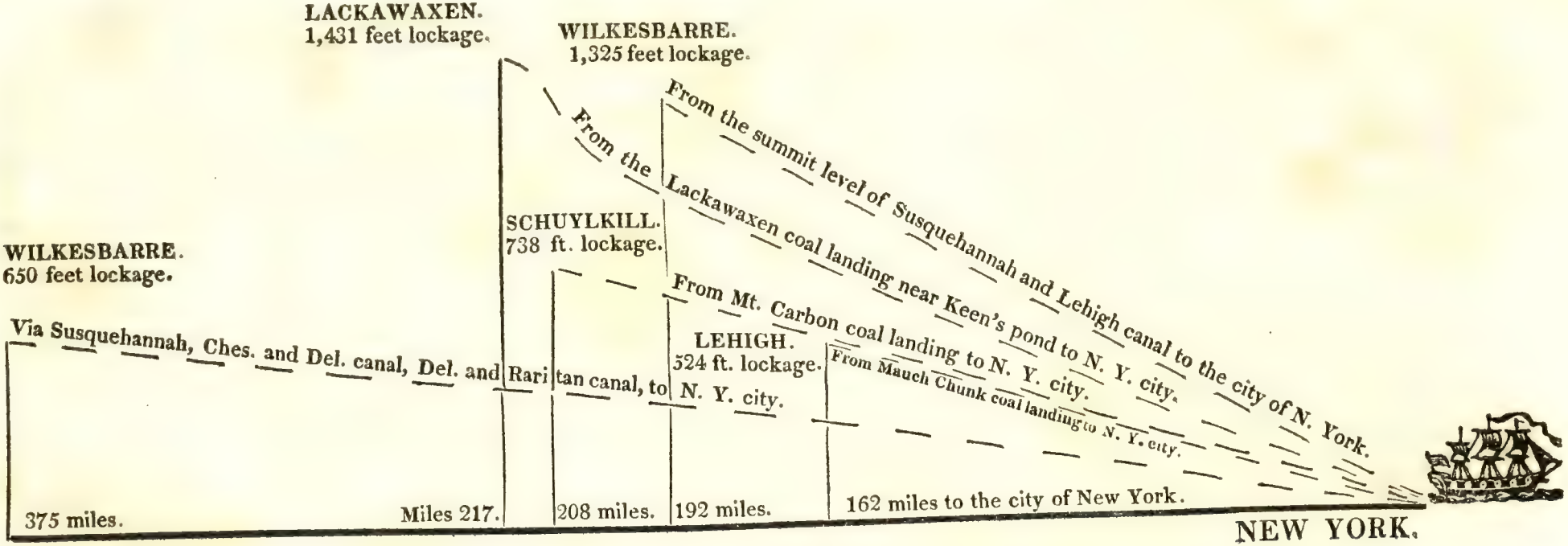
"Several of the communications delineated below, are by a mixed navigation of canals and rivers, and some of them are exposed to the hazards of the Chesapeake bay.

"The Chesapeake and Ohio canal, it is now ascertained, can be extended to Baltimore, so as to furnish a uniform line of canal navigation from the coal banks to that city.

DRAUGHTS of the comparative heights and distances of the principal districts of anthracite coal in Pennsylvania, Maryland, and Virginia, to a market on tide water.


Savage coal district. 900 feet lockage.
Cumberland district. 578 feet lockage.
Berkeley and Morgan anthracite coal district.
400 feet lockage.
To Georgetown, 186 miles.
To Georgetown, 122 miles.
From Savage mountain, 216 miles to Georgetown.
GEORGETOWN.


LACKAWAXEN.
1,583 feet lockage.
WILKESBARRE via LEHIGH.
1,325 feet lockage.
From Lackawaxen coal landing at Keen's pond to Phila.
From summit level of the proposed Susquehannah & Lehigh canal near Wright's creek to Phila.
SCHUYLKILL.
588 ft. lockage.
From Mt. Carbon coal landing to Phila. west side.
E. S. of the Ches. & Ohio canal.
578 feet lockage.
LEHIGH.
524 ft. lockage.
WILKESBARRE.
550 feet lockage.
From Cumberland to Georgetown, 186 miles.
From Mauch Chunk coal landing to Phila. E. side.
Via Chesapeake and Del. canal to Philadelphia.
317 miles.
275 miles.
186 miles.
170 miles.
132 miles.
108 miles to the city of Philadelphia.
PHILADELPHIA.


LACKAWAXEN.
1,431 feet lockage.
WILKESBARRE.
1,325 feet lockage.
From the summit level of Susquehannah and Lehigh canal to the city of N. York.
From the Lackawaxen coal landing near Keen's pond to N. Y. city.
SCHUYLKILL.
738 ft. lockage.
WILKESBARRE.
650 feet lockage.
From Mt. Carbon coal landing to N. Y. city.
LEHIGH.
524 ft. lockage.
From Mauch Chunk coal landing to N. Y. city.
Via Susquehannah, Ches. and Del. canal, Del. and Rari tan canal, to N. Y. city.
375 miles.
Miles 217.
208 miles.
192 miles.
162 miles to the city of New York.
NEW YORK.

"Sundry canal reports suggest a commentary on the preceding tables, illustrating the distances of the Northern coal mines from their nearest markets.

"New York is known to rely, at present, for a supply of coal to her great emporium, on the Hudson, and the country on the margin of her canals, upon the Lackawaxen mines in Pennsylvania; while the Schuylkill and Delaware rivers and canals are expected to supply the wants of Philadelphia from Mount Carbon and Mauch Chunk.

"The Legislature of New York has guarantied the credit of the Hudson and Delaware Canal Company to the extent of $300,000, with a view to the first object. One hundred miles above the city of New York, and fifty miles below Albany, this canal leaves the Hudson, and passing through a part of New York and Jersey, along the Wallkill, the Rendout, and the Neversink, it enters the Delaware, sixty-seven miles from the Hudson, and seventeen miles below the mouth of the Lackawaxen. In reaching the Delaware, the canal overcomes a rise and fall of six hundred and thirty-four feet. To extend this canal to the mouth of the Lackawaxen, a rise of one hundred and forty-eight feet must be overcome in seventeen miles, and to conduct it along this stream to within four or five miles of the coal mines, near its source, will require another canal of thirty-six miles, overcoming a fall of six hundred and sixty-eight feet. The lockage to be overcome in the whole route is 1,440, or, by the report of Mr. Mills, 1,431 feet, and the estimated distance from the Hudson to within four or five miles of the mines, one hundred and seventeen miles. Making, from the city of New York, a mixed navigation of two hundred and nineteen miles, and a land carriage of four miles. The canal, which is nearly completed as far as the Delaware, is but thirty-two feet wide and four feet deep, and its locks adapted to boats of twenty-five or thirty tons.*

"The following comparison between this line of navigation, and that, on which the Lehigh Company rely for the supply of coal to Philadelphia from Mauch Chunk, is from the pen of a civil engineer of Massachusetts, Mr. John L. Sullivan.

"'The Lehigh Company appear to have an advantage in possessing both the navigation and the coal, but with the disadvantage of a descending navigation only, requiring a continual expense of arks; this, therefore, may be adduced as a reason why their coal cannot be afforded much, if any, lower. For you will find it stated in the New Jersey Canal Commissioners' report, that coal at Easton, (the mouth of the Lehigh,) will cost four dollars and sixty cents per ton, which they estimate, may, therefore, be delivered to the manufactories at six dollars and forty cents. But as Easton is ninety miles from Philadelphia by water, and two hundred feet above the tide, this part of the navigation, which is double the length of the Lehigh, is to be added to that sum, together with the charges and profits at Philadelphia.'

"The same engineer, in a comparison between the advantages of the Hudson and Delaware canal, for the supply of New York and those of the Schuylkill navigation, for the supply of Philadelphia with coal, says, 'the coal on the head waters of the Schuylkill is situated nearly as far from Philadelphia as that of the Lackawaxen from the Hudson.' The

*This work has been completed on a different plan, and now comprehends 16 miles of railroad and 108 miles of canal, with 110 locks.

proprietors are, by law, entitled to a toll of nineteen cents per bushel, which is five dollars and thirty-two cents per ton. But it is not intended, at present, to exact more than eight cents per bushel, or two dollars and twenty-four cents per ton; 'yet, it can scarcely be expected that the Navigation Company will not assess as much toll upon the principal article, as may be requisite to give a good interest on the investment, not being, as a corporation, the owners of the coal, nor permitted to trade therein.'

"On a comparison of all these lines of internal navigation with that contemplated between Georgetown and the coal banks of the Potomac, the uniformity, throughout, of the navigation upon a canal of very enlarged dimensions and moderate lockage, added to the fact, that the canal will *enter* the coal mines, must give a decided advantage to the Chesapeake and Ohio canal.

"When the forests of a country have been thinned or exhausted, by the various uses to which wood is applicable, the cost of the manufacture of both lime and iron depends on the price of other fuel or mineral coal, if to be had at all.

"Russia has been sometimes induced to prohibit or suspend the exportation of timber, for the sake of her iron manufacture, to the serious injury, and, indeed, almost total ruin, of a part of her subjects. Ireland, which early manufactured iron, at one time ceased to do so, because its forests would no longer supply necessary fuel. The quantity of iron annually supplied by the English mines, was, after the middle of the last century, reduced, from the same cause, to but 28,000 tons, when Dudley discovered that it could be smelted by the substitution of coked coal for common charcoal. In consequence of this discovery, the annual production of iron in Great Britain had risen, in 1803, to 300,000 tons. Such will be the result in America, of pushing internal navigation from the Atlantic to the bases of those mountains that supply, in the same neighborhood, iron ore and mineral coal. The foreign importation of this necessary commodity will then cease, and an immense stock arise for exportation, on terms, cheaper than any other country, now known, can supply it, to the world.

"Pit coal, freed, by coking, from its bitumen, and made to resemble, as nearly as possible, the charcoal of wood, is consequently diminished in gravity. Coke is, therefore, transported in great quantity on the British canals, and is applied to various uses, as well as to the smelting of iron ore; for which, it is so extensively employed, that it may be said to be the basis of the British iron works. The bitumen, which is separated in a fluid form in the process of coking, defrays its cost, and is applicable to many of the uses of vegetable tar. England, however, continues to import, into Newcastle and Hull, large quantities of Swedish iron for the manufacture of steel, and especially, of that species which, being anciently used to make sheep shears, is called shear steel, in her manufactures.

"Iron has not been found in any considerable quantity on the Erie canal of New York. It is manufactured in the high lands on the Hudson, and procured from Lake Champlain, of excellent quality, by the Northern canal. It abounds, in every quality, on the Potomac, in the vicinity of the coal banks, and on the navigable streams of Virginia, which empty their waters into that river. The flux, essential to the manufacture of the crude ore, is abundantly supplied, by limestone, and other minerals, in the vicinity of the ore banks.

"The mountains which seem to impede the progress of the Chesapeake and Ohio canal, will, therefore, become the fruitful source of its income; which must surpass that of any canal which yields neither coal nor iron.

"When the single fact presented by the coal trade of Glasgow is duly considered, for the amount of near seventeen hundred thousand tons is exclusive of the supply of eighteen collieries, in the suburbs, which do not use the Monkland canal; when, added to this, it is recollected that, through a single county, remote from this city, that of Lancashire, in Great Britain, one million of tons is transported, there is nothing extravagant in this sentiment. The time will doubtless arrive, in America, when iron railroads will be required, not to supersede, but to aid canals, as in England, in transporting the produce of an empire, to which Great Britain bears a smaller proportion, than Europe, to the habitable globe."

Such were the facts and views, in relation to this branch of the revenue of this canal, which were presented to the House on the 30th of January, 1827, and repeated on the 2d of January, 1828, by a report which, with its supplements, constituted the only argument, oral or written, addressed to the House, in support of the subscription of a million of dollars made to the stock of the Chesapeake and Ohio canal, in May, 1828.

Since that period, the extent and position of the bituminous coal mines, on the head waters of the Potomac, have been more distinctly ascertained. They offer such facilities for mining the coal, and transferring it to the boats engaged in its transportation, as, when combined with the enlarged dimensions of the Chesapeake and Ohio canal, render it probable, if not certain, that this valuable species of coal will hereafter find its way by this channel, to all the workshops, towns, and cities of the Atlantic.

Its use in the villages and country, near the Potomac, from Harper's Ferry to Cumberland, in the public armory of the United States at the former place, where one hundred thousand bushels are annually consumed, and at the Antietam iron works, ten miles above, has proved its excellence, when compared with any other bituminous coal, to be found east of the Alleghany. Its quality is, doubtless, the same with that which, in positions less accessible from any existing market on tide water, has been certified, "after experiments made under the directions of an eminent civil engineer of Philadelphia, Mr. Strickland, to be fully equal to the Newcastle coal, which is the best in England." (Vide the first annual report of the Philipsburg Railroad Company.) The field of coal which appears near the mouth of George's creek, and on the face of Savage mountain, to the north, as well as in various places on the south side of the Potomac, on the hills near the margin of the river, is undoubtedly the same with that on Wills's creek, near Cumberland, and Jennings's and Braddock's runs, which is represented in the recent report of the Philipsburg and Juniata Railroad Company, to extend to the Alleghany and Ohio rivers; and, it might have been added, to the Monongahela and the Great Kenhawa, and their various tributaries. Every where elevated above the surface of the adjacent rivers, this coal is reached, as on the Youghiogeny, upon the Monongahela, and Kenhawa, near Blairsville on the Conemaugh, at Cumberland, and in the vicinity of Wheeling and Pittsburg, by drifts, forced into the sides of the hills and mountains, at so high a level, that the water is easily drawn off from the mine, without extra cost; and the labor of mining and delivering the coal from the entrance of the drift, into wagons or boats prepared to receive it, rarely exceeds a cent, and never a cent and a half the bushel.

So cheap is the entire process, and the structure of the boats which transport this coal to the west of the Alleghany, that it is currently sold from flat bottomed boats, fitted only, to descend the Ohio as low down, as Cincinnati, at from five to eight or ten cents a bushel. It is poured from wagons, into the cellar windows of the houses of the inhabitants of Pittsburg and Wheeling, at from three to five cents a bushel; a price less than that, at which it is delivered in Manchester, in England, after a carriage of eight miles, by the Bridgewater canal; and but a moiety of that, at which it is raised, by perpendicular shafts, to the surface of the earth, at the coal pits, in the vicinity of Richmond, about twelve miles from the tide of James river.

The superiority of the bituminous coal of the Potomac to that of the mines on James river, near Richmond, assures to it, an advantage over the latter, in all those markets, on tide water, which it may enter at the same, or even a somewhat higher price.

Its competition for the supply of these markets, with the coal of the Susquehannah, in quality the same, must rest on other considerations. Some of these are presented by the late, being also the first annual report of the Philipsburg and Juniata Railroad Company, which, with a confidence apparently well founded, anticipates for that road, a successful competition for the supply of the iron works of Huntingdon, and the country on the Juniata canal, with the portage railroad of the State, across the Alleghany. This anticipation is derived from the fact, that the Philipsburg railroad, which will cross the Alleghany, to Petersburg, on the Juniata, a point thirty-two miles below the commencement of the Alleghany portage, will save, in that distance, a lockage of 272¼ feet; that overcoming a rise of 261 feet only, it will descend 1,380 feet. This road is supposed to give a decisive advantage to the Philipsburg coal, over that, on the portage, by substituting 28 miles of railroad for 12½ miles of the portage railway, and the canal below Hollidaysburg, which embraces, "in this short distance, nearly an equal amount of rise and fall in the same number of inclined planes, and, in addition, a canal and slack water navigation of 32 miles, having 272 feet of lockage." "However advantageously (this very recent report says) *canals* may compare with railroads, for heavy transportation, it would seem that the railroad, in the present instance, must be much more advantageously circumstanced, and that coal may be delivered on more favorable terms, from Philipsburg, than from the portage, *at any point on the line of the Pennsylvania canal, below Petersburg.*"

Now, Petersburg is 265 miles from Philadelphia, by a mixed navigation of canals and slack water, including the Union canal; the locks of which, being narrow, admit of but thirty ton boats.

Here, therefore, is a railroad of 28 miles crossing the Alleghany mountain by a rise and fall of 1,641 feet, and a line of 265 miles of navigation, by canals and slack water, with locks admitting boats of from twenty to thirty tons only, to be compared, supposing the coal trade of the Potomac to centre at Cumberland, with a railroad of from 9 to 12 miles, descending Braddock's run and Wills's creek, from the north, or a canal 28 miles in extent, conducted along the Potomac, from the mouth of George's creek to Cumberland, and thence 188 miles to Washington, in the District of Columbia, affording a continuous and uniform navigation for 100 ton boats. From such a competition, the Potomac trade, in this species of coal, has obviously nothing to apprehend. A late voluminous and able report

of a committee of the Senate of Pennsylvania, computes the field of bituminous coal, on which Philipsburg is situated, at 21,000 square miles, or 13,440,000 acres.

They limit the southern termination of this coal field to the valleys of Jennings's run and Wills's creek, omitting that portion of it, probably the largest, which extends very far to the south, and for great distances on both sides of the Potomac. It has, for many years, supplied coal from the cliffs immediately above the mouth of George's creek, at the eastern base of the Alleghany, within a mile of the Potomac, where it is slid at a cent or at a cent and a half a bushel, from the entrance of the mine into the river boats, which take it down to market, at seasons of very high water.

The western branch of the Susquehannah intersects this coal district in passing through Clearfield county, west of the Alleghany. The first ark load of this coal, the above report states to have been taken, by Mr. P. A. Karthaus, from the mouth of Moshannon creek to Philadelphia, in 1828, and sold at thirty-three cents a bushel, after having been transported on tide water, from Port Deposit, on the Susquehannah, in a sloop, by way of the Chesapeake and Delaware canal.

"Mr. Karthaus," this report adds, "also took a quantity of this coal to Baltimore, where its qualities were fully tested, and it was found to possess all the properties of the best bituminous coal, *producing the finest coke*, as well as *hydrogen gas*. Since the opening of the Union canal, a considerable quantity of this coal (vid. note N) has found its way," the committee state, "to the Schuylkill and to Philadelphia."

As it does not appear that much, if any of it, has been taken to Philadelphia, since the opening of the Union canal, in sloops, by tide water and the circuitous route of the Delaware and Chesapeake canal, it is to be presumed, as is most probable, from other considerations, that the continuous canal line of water transit has been found, on trial, safer and cheaper than the latter.

Moshannon creek empties into the west branch of the Susquehannah, in Clearfield county, to the west considerably of the Alleghany mountain. Philipsburg, at the western termination of the railroad, before mentioned, is situated upon this creek, and the subscription to that road, embracing, as it does, capital from Boston as well as New York, renders it probable that the route from Philipsburg to Petersburg, on the Juniata, and thence down the Juniata to the Susquehannah canal, is preferred to any other that can be provided, between this coal field and Philadelphia.

The Pennsylvania canal, along the west branch of this river, now stops at Dunnstown, by water, many, probably not less than thirty miles, though the precise distance is unknown, below the mouth of Moshannon creek. The west branch of the Susquehannah passes from Moshannon around the northern spurs of the Alleghany to reach Dunnstown, at the mouth of Bald Eagle creek, and must have in this space a considerable fall.

"The coal of this country had descended the west branch," the committee state, "as far back as 1804, from three miles above the town of Clearfield, a point two hundred and sixty miles, by water, from Columbia." The committee say that, "as the Pennsylvania canal terminates at Dunnstown," (which is situated as Westernport, the mouth of George's creek, at the eastern foot of the Alleghany,) "and there enters the threshold or opening into the coal region, it is conceived that this is the point, from

which, the estimates may be fairly made, for the coal of the Susquehannah; because it cannot be doubted, that such facilities will be afforded, by improving the river above, by slack water navigation or otherwise, as will give to the vast mineral resources of Clearfield county, equal accommodations, and enable them to enter the canal, at this place, (Dunnstown,) "upon equal terms." The committee proceed to state that "they have obtained various estimates from those acquainted with the business, and inserted in the appendix, from which it would appear, that coal may be delivered from the Lycoming company's mines at Philadelphia, for four dollars and fifty-nine cents per ton, thus:

Cost of mining and loading boats, per ton, - -	$1 00
Toll to Columbia, 144 miles, at ½ a cent per mile, - -	72
Transportation and freight, per ton, - - -	1 37
Toll on railroad at the same rate, 80 miles, - -	40
Transportation and freight, - - - -	1 10
Total, - - - - - - -	$4 59

"Other estimates," they say, "are made by the Union and Schuylkill canals, and also by the proposed railroad ftom Middletown to Lancaster, (which would be the shortest route,) but are not materially different from the above. Mr. Philips, President of the Philipsburg and Juniata Railroad Company, estimates the cost from the mines by their railroad, the Pennsylvania canal, the Union and Schuylkill canals, at $4 97 cents per ton. Mr. Karthaus estimates the cost of 'Karthaus coal' at $5 per ton, others at $5 25, and $5 50. If we adopt the highest estimate," say the committee, "and add the expense of shipment from Philadelphia to New York, one dollar per ton, the total cost at the latter place will be six dollars and fifty cents. The shipment to Boston will cost one dollar and fifty cents, making seven dollars per ton."

The committee add, "the Chesapeake and Ohio canal, if completed to Cumberland, in Maryland, will open an avenue through which *the coal of Somerset county*, (Penn.) will find its way to the South. A continuation of the Susquehannah canal, from Columbia to Port Deposit, would place the coal of Lycoming, Centre, and Clearfield, in the field of open competition for the Southern markets."

In the whole of their report, the committee appear to lose sight, in a great measure, of the Potomac coal region, and of the great superiority which the plan and dimensions of the Chesapeake and Ohio canal must ever assure to it, in a fair competition with the canals of Pennsylvania, for the supply of the Atlantic seaboard with coal, to the North, as well as the South. This superiority, they were more likely to undervalue, from having been informed, as it would seem, that coal "is transported, in considerable quantities, in arks or flat bottomed boats, down the Ohio river, to Cincinnati, New Orleans, and the intermediate places, and sold," as their report states, "at twenty, to thirty, and forty cents per bushel." The price at Cincinnati on the contrary, has not for many years past, at any time, exceeded ten cents a bushel. It did not exceed that price when Pittsburg and Wheeling exclusively supplied the demand of that city for this species of fuel; which has, of late years, been carried down the Ohio, in great quantities, from within twenty miles above, as well as below the mouth of the Great Kenhawa, and, consequently, from mines more than 150 miles below Wheeling.

The large volume of the Chesapeake and Ohio canal assures to it, by the substitution of 100 ton boats, for boats of 30 tons adapted to the Union canal, or of 50 tons, the size of those which may pass the locks of the State canals of Pennsylvania, a similar advantage to that, which the broad and deep water of the Ohio, as well as its descending current, gives to that river over any canal: which it will possess over that of the Potomac valley, till the scarcity of timber shall render the transportation, by arks or flat bottomed boats, dearer, than by boats calculated for ascending, as well as descending the Ohio.

In computing the cost of transportation by the Columbia railroad, at one dollar and fifty cents for toll and freight, the committee rate both, at less than two cents a ton per mile, supposing the length of this road to be 80 miles. But it has been already seen, that the whole experience of the Liverpool and Manchester Railroad Company, in a country distinguished for the cheapness of its capital and labor, and abounding with all the resources of art, attests that the actual cost, to the company itself, exclusive of any toll or profit, for transporting merchandise on that road, for a series of years, has been very near, or quite, six cents a ton per mile; and this, on a railway, which, having cost more than three times as much, per mile, as the Columbia railroad, cannot be supposed to be less perfect in its construction; and consequently, to be attended with less cost, either to maintain it in good repair, or to sustain its moving power, which consists of locomotive engines propelled by steam over a road of but 30 miles in extent, and never, so far, from the coal which supplies the engines with fuel. Its price per bushel, of seven score, is $3\frac{1}{2}$ pence, being the price at which the Duke of Bridgewater stipulated with the British Parliament, to supply the town of Manchester, situated at one extreme of this short distance; while the Columbia railroad must draw the fuel for its locomotive engines, if it use bituminous coal, after it has reached Dunnstown, by a canal of one hundred and forty-four miles, and if anthracite coal be preferred, it must be taken to Columbia, a distance from the mines exceeding that between Liverpool and Manchester.*

If animal power be used on this road instead of steam, then the whole current of evidence, as to the relative utility of canals and railroads, manifests that the cost of transportation, on the latter, is at least, thrice as great as on the former.

That the coal of Somerset, in Pennsylvania, should supply the place of that, which will hereafter descend the Potomac from Cumberland and above it, as high as George's creek, it is impossible, for a moment, to conceive; though, when the Chesapeake and Ohio canal shall have passed the Alleghany, this coal may make its way into the same markets with the latter, with less profit to its proprietors.

The report of the Board of Directors of the Philipsburg Railroad Company, estimates the cost of boating with a thirty ton boat, as follows;

"One man per diem, - - - -	$1 00
One boy do. - - - -	50
Keep of one horse per diem, - -	50
Total,	$2 00

* The supply of coal, to Liverpool, by the railroad is from the Huyton mines, distant about five miles from Liverpool.

And they allow 26 miles a day for the lockage, which, from their railroad to Philadelphia, they put down at 264 miles, or $20\frac{1}{2}$ days for going and returning, being - - - -	$2 \times 20\frac{1}{2}$		$41 00
And for the use of the boat and horse they allow, as follows:			
For the former for $20\frac{1}{2}$ days, supposing the boat to cost $250; - - - - - - - - -		$3 70	
And supposing the horse and his gear to cost $100, they allow for his use and the risk of his death for $20\frac{1}{2}$ days		1 11	
The two sums making, - - - - - - - -			4 81
And for the wages and hire of a man and boy, boat and horse, drawing 30 tons, they allow, - - -			$45 81
For tolls on the 124 miles of the Pennsylvania canal, below Petersburg, they allow one-half a cent a ton per mile, which amounts to - - - - - -		18 60	
At $\frac{3}{4}$ of a cent per ton per mile, as per printed list, for 80 miles on the Union canal, they allow - -		18 00	
And at $1\frac{1}{2}$ cents per lock, for 60 miles, the toll of the Schuylkill navigation, embracing 32 locks. *they add* 48 *cents per ton, equal to* - - - - -		14 40	
For charge on the return boat on the Schuylkill canal, if empty, - - - - - - - - -		1 22	
For tolls on the canals, - - - - - - - -		$52 22	
For digging and delivering into the railroad cars 30 tons of coal, at $1\frac{1}{2}$ cents per bushel, at 32 bushels to the ton, or 48 cents per ton, - - - - -		14 40	
For toll on the railroad, as fixed by the act of Assembly, 2 cents per ton per mile, and for 28 miles, -		16 80	
Cost of transportation on the railroad, at the rate at which, agreeably to the recommendation of the engineer, it is intended to apply to the Legislature, to constitute the company public carriers, the same as the toll, or - - - - - - - - -		16 80	
		$48 00	
Loading into the canal boats, at ten cents per ton, -		3 00	
The total cost of the coal, in reaching the canal at Petersburg, - - - - - - - - -		$51 00	
Making for the total transportation of 28 miles by land, and 264 by water, for 30 tons of coal, - -		$149 03	
Or per ton, $4 97.			

It will be here seen, that the toll and transportation, on the Philipsburg railroad of 28 miles, is more than twice the sum per mile, allowed by the Committee of the Senate of Pennsylvania, for both transportation and toll on the Columbia railroad: which approximates this charge to within 50 per cent. of the actual expense incurred by the Liverpool and Manchester Railroad Company, and to half their actual charge, for transportation and profit, on their road of thirty miles extent, being themselves the sole carriers.

It is possible, though not probable, that one man and one boy may suffice, as the above estimate supposes, for conducting a boat of 30 tons: for the

boy cannot leave the horse, which he either rides or drives: one man is required to strap the boat to the posts erected at the sides of each lock, in order to prevent the lock or the boat from being injured; and some person should always remain in the boat to steer it, and to fend it off from the lock walls and gates, by a blunt ended pole, as it passes the lock.

If this be correct, another man, or a boy, at least, should be allowed for the navigation of a thirty ton boat.

Supposing that a boat adapted to the Union canal, which admits of a breadth of beam not exceeding eight feet, to enter the wider locks, either of the Pennsylvania or Lehigh canal, this necessity will be more apparent, as the agitation of the boat, by the sudden and great influx of water into the lock chambers, will require a greater exertion of strength to protect the boat and the lock from injury, than if the boat were larger.

It is believed, therefore, that the same degree of attention, and the same number of hands, will be required to conduct a thirty ton boat, by one horse, from Petersburg to Philadelphia, by the Pennsylvania canals, as will be required to navigate a hundred ton boat, with two horses, a force found to be sufficient, on the Chesapeake and Ohio canal. If extended to Savage creek, at the foot of the Alleghany, as doubtless this canal will be hereafter, the distance from the remotest coal banks, being those near the mouth of George's creek, to the Tiber creek basin, where the canal boat will come in immediate contact with the bay craft or coasting vessel ready to receive its cargo, and bear it to a distant market, will be less than 218 miles; or assuming Alexandria, the port most remote, to be the market, 221 miles.

Assuming the longest distance, and computing the wages and subsistence of two men and a boy, as in the preceding estimate, at one dollar for the former, and fifty cents for the latter, or $2 50, and supposing the day's voyage to be 26 miles, as in the former computation, and the descending boat, as in that, to return empty, the single trip will take 17 days; so that the wages of labor will amount for the trip to	$42 50
On the same principles, the keep of the two horses will be one dollar a day, and their hire, including the wear of their gear, and insurance against death, at the rate of $1 11 for each horse for 20½ days, (this trip, consuming 17 days,) will be $17 + $1 84 = - - - - - -	18 84
And supposing the toll to amount to ¾ of a cent a ton per mile for 221 miles, it will be $1 59 77/100 per ton, and for 100 tons,	165 75
And that the wear of the boat, it being more costly, shall exceed by 25 per cent. the sum allowed for its wear, in the former estimate, - - - - - -	4 62½
And the charge on the empty return boat to be equal to that of the Schuylkill canal, or $1 22 for 61 miles, - -	4 09
Making the total cost amount to - - -	$235 80½
And the cost per ton, to - - - - -	2 35 4/5

A sum less than the half of that which is supposed to be a correct measure of the cost of the toll and freight of a ton of coal from Philipsburg to Philadelphia. This excess is much more than adequate, it will be seen from the same estimate for transporting a ton of coal from Philadelphia, to Bos-

ton, or New York, to pay the additional charge of transportation from the District of Columbia, to either of these cities, or to Philadelphia; and this, without adding to the cost of transporting the 30 ton cargo of the smaller boat, the wages of the additional hand which it is supposed to require.

For the transportation of bituminous coal, therefore, there can be no question as to the superior advantages of the Potomac navigation over its northern competitors. The following table from the report of the committee of the Senate of Pennsylvania corroborates the above conclusion.

"*Bituminous coal, of the west branch of Susquehannah river.*

	Miles of railroad to landing.	By navigation to Philadelphia.	To New York.
"By Pennsylvania, Union, and Schuylkill canal to East Philadelphia - -	1 to 5	292	403
By the river Susquehannah to Port Deposit - - - - 206			
Thence to Philadelphia - - 89			
	–	295	406
By Pennsylvania (proposed Nescopeck) canal, Lehigh and Delaware canal -	–	292	345

The extracts, attached to this note, from the reports of Messrs. Roberts and Cruger, relative to the extent and position of the bituminous coal of the Potomac, the basis of the preceding estimate, cannot but confirm the above conclusion. The committee avail themselves of the example of the committee of the Senate of Pennsylvania to attach to this note, a compendious view of the various uses of bituminous coal, from the interesting report already quoted, of the managers of the Philipsburg and Juniata railroad.

When reference is had to this brief but comprehensive exposition of the value of this mineral, it cannot be considered at all improbable that in a very few years after the completion of the eastern section of the Chesapeake and Ohio canal, its tonnage of bituminous coal, alone, will carry the dividends upon its stock, as has been the consequence on so many British canals engaged in the transportation of this commodity, to the limit of its charter, which is fifteen per cent. per annum. The Potomac alone, and its tributaries, navigable at high water, afford a coast to be supplied with coal, of 1,400 miles above the tide, and more than 200 below. Within a few miles of this coast, within a distance, nowhere exceeding 12, are many of the most flourishing inland towns of Maryland and Virginia, besides the cities of the District of Columbia, which, regarded as one, have now, a population which ranks them as the sixth, while a railroad of less than 40 miles, is about to connect them with the third seaport of the United States. Twenty counties of Virginia, ten of Maryland, and three of Pennsylvania, may be expected hereafter to derive their supply of this species of coal from the Potomac mines. In all those towns and many of those counties, the consump-

tion of coal would now displace that of wood, as common fuel, were the price of the former reduced, as it shortly will be, by the completion of the Chesapeake and Ohio canal. Such is the condition of large portions of Franklin and Adams counties, in Pennsylvania, of Washington and Frederick counties, in Maryland, and Berkeley, Jefferson, and Loudoun, in Virginia. How fast this use of coal would be extended, after it was once introduced, may be conceived, by referring to the value of the fertile lands of those counties, retained in wood, for the supply of fencing and fuel, the produce of a few acres of which, if cleared and reduced to cultivation, will supply any farm with both, when lumber and coal shall be drawn from the head waters of the Potomac by a continuous canal. But the quantity of coal demanded as fuel for common domestic uses, bears in any improving country, but a very small proportion to that vast consumption which takes place in the various manufactures, of which it now supplies, through steam, the moving power; and when the limited extent and remote position, from the seacoast, of the field of bituminous coal east of the Alleghany is considered, and the few channels of water communication, between it and tide water, are regarded, it is difficult to assign to the tonnage of this commodity, on this line of canal, which is both the shortest and the cheapest, any limits whatever.

But it is not on the supply of this valuable species of coal alone that the profit of this canal will rest.

The recent discovery of anthracite coal in the mountains of Virginia, near the Chesapeake and Ohio canal, in the same range with the three great fields of this species of coal in Pennsylvania, and at the same distance from tide water, assures to this canal the supply of its own markets with this species of coal, and opens to it, a fair competition, with the canals of Pennsylvania, and the Hudson and Delaware canal of New York, for extending that supply to the cities, to the north of the Hudson, and south of those rivers.

The report of the committee of the Senate of Pennsylvania supplies much curious and interesting information respecting the extent, position, and geological formation of the three great fields of anthracite coal, which they rationally conclude not to extend to the north of the Delaware, on the south side of which the Hudson and Delaware Canal Company have sought, and found it; and, by means of their complicated railroad and narrow and obstructed canal, have already brought it into extensive use. Very near 600,000 tons of anthracite coal were raised and transported to market in the last year, chiefly from two of those three fields, the nearest and the most remote from the Atlantic, by three lines of communication, two ending at Philadelphia, viz. the Schuylkill navigation on the west side, and the Lehigh, assisted by the State canal along the Delaware, and twenty miles of that river.

The following table, from the report published by the Senate of Pennsylvania, and so often referred to in this note, supplies the length of transportation by each of those routes; the last, or that by the Hudson and Delaware canal, which is briefly described in the text of this report:

Distance from the several coal regions to a general market.

Anthracite coal.	Miles of railroad to landing.	By navigation to Philadelphia.	To New York.
Pottsville, on Schuylkill, to West Philadelphia	0 to 6	106	234
Lehigh coal from Mauch Chunk to East Philadelphia	5 and 9	124	177
Beaver Meadow coal to East Philadelphia	12	132½	185½
Wyoming coal by Lehigh and Delaware canal	10	150½	203½
Carbondale coal	16	"	200

The letter of Mr. Purcell, a resident engineer of the Chesapeake and Ohio Canal Company, furnishes the last information received of the position of the anthracite coal field of Virginia, which has been traced from the meadow branch of Sleepy creek to within nine miles of the Potomac, which is 124 miles above the mouth of Tiber creek, in Washington. This point will be reached and passed in the proposed extension of the Chesapeake and Ohio canal, at the distance of 15½ miles from its fifth dam across the Potomac, to the mouth of the Great Cacapon river, a fact which urges, with irresistible force, the expediency of a prompt completion of so much of this canal, since it will afford immediate access to this extensive field of anthracite coal, as well as to the great lumber region described in the report.

In addition to the other uses of anthracite and bituminous coal, the latter has been found so essential to the best preparation of the hydrate of lime, for hydraulic cement, that the President and Directors of the Chesapeake and Ohio canal insisted, in their contracts, upon its use in preference to wood, at the manufactory near Shepherdstown; and the anthracite has been found at the kilns on the Rock creek basin to be much better calculated for burning the common lime, than the bituminous coal, from not melting or running, and, therefore, affording a free current of air through the kiln as it is gradually and slowly consumed.

Extracts from the report of the President and Managers of the Philipsburg and Juniata Railroad Company to the stockholders.

"The uses for which bituminous coal is especially adapted are for domestic purposes, the arts generally and more particularly for air furnaces, steam engines, and smiths' work; for the production of hydrogen gas, and in the form of coke, for the smelting of ores. The first of these, though the last in importance, where manufactories are extensively carried on, will probably, on the first establishment of the road, constitute a large proportion of the demand. As one ton of coal is fully equal in its effects to three cords of wood,* whilst it is a much safer and less troublesome

* A recent experiment made on board the King William steam packet, from Pictou to England exhibits the proportion *as exceeding* three cords of wood to one ton of bituminous coal, and the Ithaca and Oswego Railroad Company rate four cords to the ton.

kind of fuel, it is very obvious, that wherever firewood costs more than one dollar and fifty cents per cord, and coal can be obtained for five dollars per ton, the latter will be preferred for domestic purposes.

"The decided advantages in the use of bituminous coal, for the generation of steam, may be comprised under two heads, safety and economy. To establish a claim to the first, it may be necessary to explain the cause, to which practical men attribute nine-tenths of the accidents which have happened of late years to steamboats on the waters of the United States. A reference to most of those cases will show, that they have generally occurred immediately after the boat has left some landing place. The practice on arriving at the landing is (owing to the uncontrollable nature of a wood fire) to let off steam, which is often done to such an extent, (particularly on the Western waters, where the boilers used are very small, with flues usually passing through them, still further reducing their capacity,) that too little water remains in the boilers to prevent the inordinate action of fire upon them. In this situation they become nearly red hot, and when the boat proceeds again on her passage, with the necessity of immediately replenishing them, the forcing pump is set in operation, when the cold water injected, coming in contact with the red hot iron, the expansion is so terrific, that it becomes a matter of wonder, not that so *many*, but so *few*, accidents have occurred. Now, with bituminous coal, no danger, whatever, can be apprehended from this source. Five minutes before the arrival of the boat at the landing place, the fireman opens the doors of the furnace, and throws on the fire a quantity of small coal, (such only ought to be used for steam engines generally,) without stirring the fire. The cold air rushing between the now black mass and the boilers, will prevent accession of heat, and during the five minutes to elapse before the boat stops, the principal part of the steam previously generated, will have been used, and none whatever need be let off. When desirable to proceed, it is only necessary to stir the fire, close the doors, and the boat immediately pursues her way with well filled boilers, and without the slightest danger. As a proof of the correctness of this reasoning, it may be asked, to what other cause is to be attributed the safety of the English steamboats, which use *bituminous coal* exclusively, and on board of which we never hear of the explosion of boilers, although accidents, occasioned by carelessness and running foul of each other, do sometimes occur? As, however, one instance of an engine conducted on this plan at home, is worth hundreds at a distance, the Board are happy to have it in their power to convey an invitation, on the part of the proprietor of the screw factory at this place, to all practical men, to visit and examine personally the mode practised in the management of the steam engine, at which little or no steam ever escapes whilst the hands are at dinner, and during the night, and at which the fire is never suffered to be extinguished, except when it becomes necessary for the purpose of cleaning the boilers.

"The economy in the use of bituminous coal for steamboats will depend much upon the situation where it may be used; but let us suppose a case on the Hudson river, which is as remote from the mines as there is any probability of this coal being transported. The large boats on the Hudson consume, during a trip from New York to Albany, which occupies from ten to twelve hours, from forty to forty-five cords (short lengths) of pine wood, at an average of four dollars per cord, equal to thirty-five cords, full measure of one hundred and twenty-eight cubic feet, at five

dollars per cord, one hundred and seventy-five dollars. With well-constructed fireplaces, eleven chaldrons of coal would accomplish the same result, which, at nine dollars per chaldron, at which it is believed it can be afforded, is ninety-nine dollars, or a saving of nearly one-half, besides occupying only one-fifth of the space, and thereby allowing so much more room for passengers, and diminishing in like ratio the cost of hauling, &c. With such decided advantages in its favor for the generation of steam, it is only necessary for the facts to be promulgated, and the article furnished in sufficient quantity, to ensure an immediate demand for the supply of steam engines of all descriptions.

"For the production of hydrogen gas, for lighting towns, factories, and houses, large quantities of bituminous coal (as the cheapest material from which it can be obtained) are used in England. In London it is stated that, up to 1830, one thousand miles of pipes, for lighting the streets, had been laid, and that the consumption of coal, for this purpose, was thirty-eight thousand chaldrons in that year. In Liverpool and Manchester, it is believed, the consumption is much greater, in proportion to the population; as, in the former place, gas is more in use for lighting private houses, into which it is introduced by gas companies, who provide the apparatus, receiving their remuneration according to the quantity of gas actually used, which is determined by a gauge connected with the reservoir or gasometer; and in the latter place, the ordinary consumption is still further increased, by the enormous supplies requisite for the factories. But the use of gas is not confined to large towns. There are few places of the size of Burlington, that are not lighted by it; and a member of this Board remembers to have seen it employed for lighting a solitary turnpike gate, between Stockport and Macclesfield. The mode of extracting the gas from bituminous coal, is by a very simple process of distillation, in the course of which, tar and ammoniacal liquor are also disengaged, the residuum, in the retort, being coke. The following estimate of the product of one chaldron of coal, subjected to this process, is taken from page 186 of 'Cooper on Gas Lights,' to which the Board refer for a mass of interesting information on the subject, comprising the evidence of many scientific and practical men, taken before a committee of the House of Commons.

"'One chaldron of coal, from twenty-five to twenty-eight cwt. or thirty-six bushels, produces from 1¼ to 1½ chaldrons of coke—from 150 to 180 lbs. of tar, at 10 lbs. the gallon—from 220 to 240 lbs. or 22 to 24 gallons of ammoniacal liquor, and about 10,500 cubical feet of gas.'"

As soon, as practicable, after the organization of the Canal Company, the President and Directors sought to bring to public notice the peculiar resources of the country which was to be the field of their operations. To revise the estimate of the western section, but one subdivision of which, out of several, had come under the supervision of Messrs. Geddes and Roberts, in the short time allowed them, for their examination, and report in 1828, the President and Directors associated Alfred Cruger, an assistant and subsequently a resident engineer, on the canal, with the last named of those two gentlemen, in an examination, survey, and estimate of that entire section, and instructed them, while in the performance of this duty, to explore the coal region at the head waters of the Potomac, and to report, especially, "on its general features and character, and the means of connecting it with the Chesapeake and Ohio canal." While laying down the line, and estimating the cost of a branch canal extending above Cumberland to the mines

of Savage and George's creeks, and surveying the lines of such railroads as might prove useful in the vicinity of Cumberland, the following letters were addressed by those gentlemen to the Canal Board :

"REPORT AND ESTIMATE OF THE PROPOSED CANAL UP THE NORTH BRANCH OF THE POTOMAC RIVER.

"*To the President and Directors of the Chesapeake and Ohio Canal Company:*

"GENTLEMEN: I take the liberty to present to the Board the following report and estimate of the proposed navigable feeder up the North Branch of the Potomac, from Cumberland to the mouth of Savage. This location was made by Mr. Alfred Cruger, assistant engineer, (except the lower five miles,) to which is annexed the necessary additions to the first five miles; and, also, a tabular statement comprising the estimates of the whole line, with some previous and subsequent remarks on the same.

"Respectfully submitted.

"NATHAN S. ROBERTS,
"*Civil Engineer, Member of the Board of Engineers, and*
"*Engineer of the 2d Division of the Ches. and Ohio Canal.*"

"To NATHAN S. ROBERTS, Esq.
"*Member of the Board of Engineers of the Ches. and Ohio Canal:*

"SIR: This report contains the plan and estimates of the proposed canal up the North Branch of the Potomac river, commencing at a point $5\frac{1}{4}$ miles above Cumberland, (where the location for a navigable feeder, made in June last, ends,) and terminating at the mouth of Savage river.

"The dimensions are in conformity with the instructions from the President and Board of Directors, which require 48 feet surface and 6 feet depth of water, with locks of dimensions similar to those on the main canal; and the estimates are based upon these requisitions.

"The valley of the North Branch, through which this canal will be carried, exhibits the usual characteristics of those streams which have forced passages through the various ridges composing the Alleghany mountains; rocky points of the separated and broken mountains, alternating with rich alluvial deposites. The construction of the work at these passes will involve heavy embankments and river walling, with the removal of occasional points of rocks; through the alluvial bottoms, the construction will be attended with the greatest possible facilities. The length of canal that will be constructed over the difficult ground is small when compared to that of the more favorable description; more so than is usually found on streams so near the summit of the Alleghany mountains.

"In the estimate of the 39th section, there is an item for a tunnel, or, more properly, a gallery. This is a case where a vertical stratum of rock projecting at right angles forms the face of the mountain, and, extending itself a considerable distance into the river, with an elevation of 60 feet above its surface, renders it more expedient to pierce it by a gallery than to blast it off, and remove the materials. This tunnel will be 120 feet in length, (the distance through the rock,) the surface of water 20 feet, and towing path 5 feet wide. This reduction of breadth will form no impediment to the navigation, as a lock is placed immediately below and in connexion

with it. An item is entered into the detailed estimate for arching the top; this is a contingent expense, and depends upon the nature of the internal formation of the rock. The upper and lower faces of this rock are perpendicular and parallel to each other, and it preserves its width of 120 feet to its extremity. The plan adopted permits a much better direction to be given to the course of the canal.

"With regard to materials for the various structures, it will be observed that stone for the ordinary purposes is abundant; but that for the facing and hollow quoins for the locks, will require in some instances to be brought from a distance. Common limestone is scattered throughout this section of country. Timber of every description, and of superior quality, abounds in the immediate vicinity of the whole line.

"The supply of water for this canal will be obtained from the North Branch, below the mouth of Savage, where a dam is thrown across the river to effect this object; by which an extensive basin will be created for the reception of such articles as may be floated down the North Branch and Savage rivers, to be admitted into the canal by a guard lock connected with the dam. 25 miles will be supported by this resource, when the river is resorted to again to feed the remaining distance of $5\frac{1}{4}$ miles to Cumberland, and to afford an additional supply for the main canal descending the Potomac."

Extract of a letter from A. Cruger.

"As the design in forming this branch canal is to afford to the district through which it is intended to pass, a cheap and convenient access to the main stem, a brief description of the country and its resources (although not within the scope of my instructions) may not be inapplicable to the subject.

"The soil is in general well adapted to cultivation, and the country susceptible of vast improvements. That of the bottoms (which are very extensive) is an alluvium formed from the decomposition of the adjacent mountains, and deposited by floods; it is in general argillaceous, composed of the debris of the more solid formation, contains much vegetable mould, occasionally mixed with gravel and loose rocks, and is endued with remarkable fecundity. The soil of the upland is also well adapted to cultivation, though not so productive as that just described; the sides and summits of many of the mountains are covered with farms in a high state of improvement. Ascending the river, limestone is met with in several localities, amid the general formation, which is sandstone, when, on reaching the pass through Dan's mountain, (see map,) 5 or 6 miles below the entrance of Savage river, it disappears entirely. The sandstone then alternates with bituminous shale, indicating the vicinity of coal.

"Coal, which constitutes the great source of wealth of this region, may be said to be inexhaustible. The vast and increasing importance of this mineral, as a necessary article of fuel, as well as from its peculiar application to manufactures, renders its use indispensable, and makes it desirable that every facility should be given to its distribution.

"By an inspection of the accompanying maps, it will be perceived that Savage river, forcing a passage through Savage mountain, unites itself with the North Branch; after having formed this junction, and receiving George's creek, they collectively force their way through Dan's moun-

tain. It is where these disruptions of the mountains have occurred, that coal is observable on their faces. With the mouth of Savage as a centre, and a radius of 5 or 6 miles, a circle could be described, comprising what may be termed the heart of the coal district. The sides of the mountain, in several instances, present a declivity so abrupt, that coal may, by the intermediate use of a slide, be thrown directly from the bed, into the boats lying in the canal or river.

"From the base, to the summit of these mountains, 4 distinct and separate veins of coal are observable, of 2 feet 10 inches, 3 feet, 6 feet, and from 10 to 14 feet respectively, increasing in thickness as they ascend; the highest is 950 feet above the mouth of Savage, and 1,272 above Cumberland. This upper vein has been opened in several instances on the different mountains, and discovers itself in numerous others, where torrents have removed the superstratum of earth; these various indications on the opposite ridges, prove that the vein is on one and the same level. The coal is pure, lustrous, and rich, and, from the peculiar advantages attending its situation, can be furnished for ½ to 1 cent, per bushel, at the bed. The larger vein is supposed to be the same as that opened near Frostburg, and it is thought by those who are conversant with its formation, to increase in depth as it progresses southwardly. In addition to coal, iron ore is found in considerable quantities. Timber for ordinary purposes, with valuable ship timber, abounds throughout this district; white pine for masts and spars, it is said, exists in large quantities. The surrounding country, including the glades, is better adapted to raising sheep, than perhaps any portion of the United States.

"The section of country subject to these observations appears to possess in a high degree all the desiderata to render it a manufacturing country. 1st. A sufficient and constant water power: this can be found both on the North Branch and Savage rivers. 2d. A healthy and salubrious climate, with subsistence cheap and plentiful; for manufacturing estalishments, these circumstances are of primary importance, as they affect in an eminent degree the price of labor. 3d. A position where materials abound in the vicinity of the works that will require their consumption; this is also an important consideration, as a difference of two or three cents the bushel in the article of coal alone will occasion a difference of several thousand dollars per annum, in extensive manufactories, besides the fact demonstrated by experience, that it is cheaper to transport the articles manufactured than the materials, in the ratio of 10 to 1.

"The advantages of this water conveyance would command not only the freight of the above enumerated heavy articles, but also the trade of an extensive back country, comprising part of Alleghany county (Md.) and several counties in Virginia.

"The following pages will be found to contain a detailed estimate of every section of ½ mile, closed with a recapitulation.

"All of which is respectfully submitted.

"ALFRED CRUGER, *Civil Engineer.*

"GEORGETOWN, *September* 2, 1829."

Extract from a letter of N. S. Roberts.

"In addition to what has been stated herein, by Mr. Cruger, I would observe, that, in order to ascertain the relative height of the great coal vein in the vicinity of Westernport and Savage, the level of the Poto-

mac canal was continued from the mouth of Savage to the great coal vein, about one and a half miles in Virginia, and the elevation of the vein was found to be - - - - - - - 950 feet
To this add the lockage from Savage to Cumberland, - 322 feet

And it gives the height of said coal vein above Cumberland, 1,272 feet
From this take the height of Eckhart's mine, as before stated, 1,167 feet

And it shows that the Westernport vein is higher than Eckhart's, by 115 feet

"On the advantages of this navigable feeder, as enumerated by Mr. Cruger, in his report, herewith presented, I would observe, that while this location was going on, I spent some time in viewing the country, accompanied by Mr. Cruger, for several miles around, in the vicinity of Westernport and Savage, and, from the information thus obtained, and from a number of gentlemen, respectable for their intelligence and knowledge of that section of country, who accompanied us, I am well convinced of the great importance this canal would be to that section of Maryland and Virginia, in an agricultural, commercial, and manufacturing point of view. But the greatest amount of business on the canal would be derived from the coal, the iron, and the lumber, which so much abounds in that region of country. The termination of this canal at Savage would be in the centre of a body of coal, which might be brought to it by branch railroads, from the heads of the Potomac, about thirty miles, and from eight or ten miles up George's creek, to Westernport. The coal district thus accommodated would be not less than five miles wide, covering a surface of more than two hundred square miles. Over at least one-fifth of this it is believed the thick vein of coal extends, which measures, where it is now opened, at least thirteen feet thick. But the coal mines that could be opened, within five miles of Westernport and Savage, would yield coal to an immense amount. As each square mile of the great vein alone would yield more than two hundred millions of bushels of coal, or sixty millions of tons, and if it could be exported at the rate of five hundred tons per day, it would require four hundred years to exhaust one square mile of the great coal vein! Iron ore of excellent quality is said to abound in this coal district; and with the facilities of a canal transportation, together with the cheapness of bituminous coal, charcoal, and subsistence in a very healthy country, would be an inducement to the enterprising of our citizens to extend the manufacture of iron to a great amount, and thereby improve and give great value to the water power that might easily be created, on Savage river and the Potomac, for all the manufacturing and mechanical purposes of a very extensive population.

"Next in importance to the mineral resources of this section of country, the timber would afford an important article of transportation, in various kinds of lumber—as the oak and many other valuable kinds of timber abound in all directions, and the white pine, suitable for spars and masts of ships of the largest size, and of the first quality, is said to abound on the upper branches of the Potomac. All these advantages to the country, and all these important articles of transportation, at present of but little value, would be in a manner created by constructing this canal, by opening a door which would invite not only our own population, but would hold out a great inducement to the liberal minded manufacturer, mechanic, and agriculturist, to emigrate from the mother countries, to participate in the

improvements so rapidly going forward in this our happy land. All which is very respectfully submitted.

"NATHAN S. ROBERTS,
"*Civil Engineer, and Member of the Board of Engineers of the*
"*Chesapeake and Ohio Canal.*

"To the PRESIDENT AND DIRECTORS
"*of the Chesapeake and Ohio Canal Company.*
"GEORGETOWN, 18*th September*, 1829."

"*To the President of the Board of Directors of the Chesapeake and Ohio Canal Company.*

"SIR: In compliance with your letter of instructions relating to the coal mines contiguous to Frostburg, and between that place and Cumberland, the following observations and calculations have been made preparatory to the location of railroads, to connect those mines with the Chesapeake and Ohio canal, as advised:

"And before the party arrived, (from Pittsburg, where I finished the western section,) a particular view was taken of the coal district, and of the two valleys that lead from them to the line of the Chesapeake and Ohio canal, on Wills's creek, above Cumberland, and other preparatory and important information from gentlemen who accompanied me, and whose knowledge of those localities was very necessary to a judicious and satisfactory investigation, was obtained. With all the information these observations could afford, the business was commenced.

"The first coal mine that was examined is situated 8 miles and 13 chains west of Cumberland, and adjoining the south side of the national road, and known as Eckhart's mine.

"This is the thick vein which is so valuable on account of the quality, as well as the quantity of coal which it yields.

"The elevation of Eckhart's mine is as follows, viz.

Cumberland is situated above tide at Georgetown -	635 feet.
Eckhart's mine, on the national road, is above Cumberland	1,157 feet.
And the same coal mine is above tide at Georgetown	1,792 feet.
The tunnel on the summit level of the Chesapeake and Ohio canal is above tides at Georgetown - - -	1,972 feet.
So that the coal mine of Eckhart's is lower than the tunnel by - - - - - -	180 feet.

"From Eckhart's mine a level was carried northwardly, and in about one mile the levels of five different mines were taken, and were all found below the place of beginning, although it was the same thick vein. The lowest was Mr. Hoye's old mine, situated or opened in a valley, and from which issues one of the branches of Braddock's run: this mine was found to be the lowest in the vicinity, and was 40 feet lower than Eckhart's mine. These mines are about half a mile apart; but, crossing this valley, and proceeding northwardly about 15 chains, we found Ward & Hoye's new mine to be 35 feet higher at the east end than the old mine in the valley, and only 5 feet below the mine on the national road, at the place of beginning.

"From these mines, which are on the head branches of Braddock's run,

a level was carried (from Ward and Hoye's new mine) about 2 miles 5 chains west, over the dividing ridge, which abounds with coal, and which rose 172 feet above Ward and Hoye's mine. This level was continued down to Frost and Neff's coal mine, which is about $\frac{1}{4}$ of a mile north of Frostburg, on the national road, and in the upper end of the valley on one bank of Jennings's run. The level of this mine being taken, was found to be 65 feet lower than Eckhart's mine, 60 feet below Ward and Hoye's new mine, and 25 feet lower than Hoye's old mine, which is very similarly situated to Frost and Neff's mine; both being in a valley at the foot of a hill. Several other coal mines were examined, and it appeared that they generally have a dip to the west and southwest, and that they are considerably lower when they have been opened in the valleys than those opened in the hills.

"The deep vein, as it is called, will probably not vary much from the plane above mentioned. But it is stated that the dip of the great vein on the west and northwest branches of Jennings's run, is to the east; but, as the vein is not much opened, the fact could not be so well ascertained; but that great quantities of coal abound in all those valleys and hills, sufficient proof was obtained from what is already opened.

"This coal district is hilly, but is a valuable farming country, and is well cultivated: the soil is a mixture of slate, sand, and clay, and, in some places, of calcareous decompositions, and is very fertile, yielding abundant crops of the various products of agriculture; and, being moist, from its altitude, is remarkably favorable for productive meadows and luxuriant pastures. In these hills and valleys three distinct veins of rich bituminous coal are frequently opened. The first or lowest vein is near the base of the hills, and is from $2\frac{1}{2}$ to $3\frac{1}{2}$ feet thick. This was the first vein discovered, and was opened about twenty years ago by Mr. Rizor, and the coal was held in high estimation for many years, until the thicker veins were discovered. The second vein is from 80 to 100 feet higher in the hills, and is from 4 to 6 feet thick. The third and most valuable vein is found nearer the summits of the hills, and in the upper parts of deep valleys. This vein is from 8 to 10 feet thick, and this vein, like the veins below, is between strata of rock. The bed on which the coal rests, and the roof which covers it, is of slate, with a great mixture of coal; but the coal diminishes, and the slate prevails for three or four feet in thickness. This often gives the mine the appearance of uncommon depth, until it is thoroughly opened. But in those mines that are wrought to any great extent, the vein of pure coal is about eight feet thick, subdivided horizontally by three or four very thin veins of slate, seldom more than half an inch thick. Next above the slate roof is sand rock, in thick layers, and is often of a quality suitable for the various purposes of freestone in building. There is a preference given to those mines that lie deep, and have a moist situation, and that have a considerable height of hill over them—the coal from such mines being more pure and solid, and quarries in much larger blocks, and is much less liable to crumble and waste, in handling, than the coal from those mines situated so near the tops of the hills as to be too dry, and having but little depth of earth over them.

"There are at this time opened and in operation on the head branches of Braddock's run, ten coal mines, and four mines on the branches of Jennings's run, besides partial openings in many other places; and it is ascertained that these veins can be opened in any part of the hill having the proper elevation.

"The great coal district having Frostburg a little north of its centre, is bounded by Savage mountain on the west, extending from the west branch of Wills's creek to Savage river, and by the same mountain continued southwest to the head branch of the Potomac, and on the east by Little Alleghany, Piney mountain, Dan's mountain, and the same mountain continued into Virginia to the upper branches of the Potomac. The space or width between those two ranges of mountains is from five to seven miles wide, and sixty miles long, making a surface of near 400 square miles, over a great part of which coal is known to abound. I have seen the great vein opened in three sections of the above district. 1st. At Troutman's, about 1½ miles south of Wills's creek, (14 miles east of the tunnels.) 2d. In several places near Frostburg. 3d. About three miles north of Westernport, in the valley of George's creek, at Neff's mine. And, 4th. In Virginia, about 1½ miles south of the mouth of Savage, where this vein was ascertained to measure at least 13 feet thick, of very pure coal. And it was confidently affirmed, that near the heads of the Potomac, this vein is in many places at least 20 feet thick, and is situated on the very banks of the river.

"By these observations, it is ascertained that the veins of coal are from 2 to 5 feet thicker near Westernport and Savage, than they are around Frostburg, and that they become much thicker proceeding up the Potomac to its sources; so that Westernport and Savage seem to be nearly central in the great coal district of George's creek and the Potomac. But that part of this great coal district, situated around Frostburg, and which is accommodated in a particular manner by the contemplated railroads, is computed to be at least 10 or 12 miles in length, from northeast to southwest, and from 5 to 7 miles in width. But admitting only one-third of this district, and that only the great vein should be opened, the quantity of coal contained would be more than four thousand millions of bushels. This vast quantity might be brought on branch railroads leading from the mines to the main railroads leading through the centre of this body of coal along the valleys of Jennings's run, and of Braddock's run, to be delivered into boats, or conveniently deposited on the margin of the Chesapeake and Ohio canal, from them to find an easy and cheap transportation to the towns and cities on the Potomac, the Chesapeake, or to the Atlantic.

"The line of a railroad down the valley of Braddock's run was commenced at a bench about four chains east of Ward and Hoye's mine, as being a very central position. This line was located down the north side of said run, and along the southern declivity of the coal hills, and parallel to the national road, which is on the south side of Braddock's run.

"The line was so graded that a principal branch railroad can connect with the main line at Porter's or Winter's tavern, to lead up a valley to the southwest, in which several coal mines are opened.

"The second great branch is to connect with the main line at Mr. Clary's tavern, and is to lead up the valley in the direction of Braddock's old road, and of the Westernport road. Several mines are already more or less opened in this direction; this branch would lead also to great bodies of coal on the head branches of George's creek. The ground thus far is remarkably favorable, and for a mile below, but as the line passes at the foot of Piney mountain on the left hand of Dan's mountain, where Braddock's run has broken through them on the right, the ground is much less favorable for a railroad; for about one mile after passing these mountains, the

hills become low, and no coal has been discovered. From the 4th mile, and opposite Shaw's tavern on the national road, the railroad turns gradually to the left, and follows the left side of the valley, and in the 6th mile crosses Braddock's run, and reaches the place of termination at a site for a proposed basin to be formed in Wills's creek and the mouth of Braddock's run, and connected with the Chesapeake and Ohio canal by a dam below, across Wills's creek. The whole of the line is on very favorable ground, except the passage at the foot of Piney mountain before observed; the road has a fine southern exposure the whole way. The length is 7 miles and 51 chains, and the descent 1,103 feet."

"The following are the dimensions and estimated cost of constructing the railroad from Ward and Hoye's mine to the line of the canal at Wills's creek, as above stated. The bed of the road is to be 12 feet wide between the ditches, and to be raised about one foot above the upper drain or ditch. When prepared for the purpose, the railing is to be put on as follows: Sleepers seven feet long, ten or twelve inches diameter, to be laid across the road about four feet apart, bedded on stone; in these, the side rails are to be secured by key mortices, at the proper distance apart for the width of the carriages; the side timbers being properly keyed into the bed timbers, the inner edge of each side rail is to be plated with iron of one and three-quarters inches wide, and three-eighths of an inch thick, to be properly secured by spikes with counter-sunk heads. The road, then, is to be raised between the timbers with pounded stone, where necessary, to a level with the top of the bed timbers, and all between the tracks or side timbers, so as to make a firm and permanent road to support the weight of the loaded carriages and horses thereon."

"The railroad, as located down the valley of Jennings's run, would afford transportation to a very great quantity of coal. It commences near the head of the valley, where the mine of Frost and Neff is now opened, and others in the vicinity. Frost and Neff's mine presents a thickness of nearly ten feet of coal, which is of the first quality. This vein, without doubt, extends to Savage mountain, westward, under Frostburg, to George's creek, south, and to all the mines of Hoye, Ward, Myers, Eckhart, Hoffman, and others, on Braddock's run, &c. Besides, the same vein is found on Robinson's, Comb's, Arnold's, Porter's, and up the west and north branches, as shown on the map, all of which could be brought, by branch railroads, from the mines to the main line. This line is located on the northwardly side of Jennings's run, except that it crosses the run twice on the eighth mile, to render the line cheaper, and give a better direction. It has a favorable southern exposure its whole length, and terminates on the line of the Chesapeake and Ohio canal, near the mouth of Jennings's run, one and a half miles above the mouth of Braddock's run, where a spacious basin might be made in the canal, by a dam across Wills's creek, just below the mouth of Jennings's run.

"This road is longer, and would be more expensive than that on Braddock's run, but, when made, its utility would be equal, and perhaps superior. The distance from Frost and Neff's coal mine to the line of the canal, at the mouth of Jennings's run, is nine miles and three chains, and the descent one thousand and twenty feet."

"By the annexed tabular statement, it will appear that the average cost of these railroads will be $3,306 per mile, for a single track; and, as the transportation is expected to be all one way, but one track will be necessary, except perhaps at a half way place, or branches to mines, &c.

"*A TABULAR STATEMENT showing at one view the length, and different items composing the expense, of each section of these respective railroads, and, at the bottom, the length of each railroad, the expense of each stem, and the consolidated expense of each railroad when completed.*

BRADDOCK'S RUN RAILROAD.

Section.		Grubbing.	Bridges.		Excavation.			Embankment.			Walling.			Total cost.
No.	Length.	Cost.	No.	Cost.	Cubic yds.	Price.	Cost.	Cubic yds.	Price.	Cost.	Perches.	Price.	Cost.	Dolls. cts.
1	40	$60 00	–	–	140 at	15 cts.	$21 00	350 at	14 cts.	$49 00	– –	–	–	130 00
2	40	60 00	2	$100	680 at	15	102 40	400 at	15	60 00	– –	–	–	322 40
3	60	85 00	–	–	640 at	15	96 00	300 at	15	45 00	316 at	50 cts.	$158 00	384 00
4	40	60 00	–	–	660 at	20	132 00	125 at	20	25 00	474 at	40	189 60	406 60
5	40	60 00	1	50	520 at	15	78 00	400 at	14	56 00	475 at	40	190 00	434 00
6	40	60 00	–	–	420 at	15	63 00	400 at	15	60 00	423 at	40	169 20	352 20
7	40	45 00	–	–	360 at	12	43 20	950 at	14	133 00	– –	–	–	321 20
8	40	45 00	–	–	320 at	14	44 80	450 at	14	63 00	400 at	40	160 00	312 80
9	40	10 00	–	–	120 at	10	12 00	600 at	10	60 00	– –	–	–	82 00
10	40	10 00	–	–	120 at	10	12 00	560 at	10	56 00	– –	–	–	78 00
11	40	30 00	–	–	150 at	12	18 00	460 at	12	55 20	– –	–	–	103 20
12	40	46 25	–	–	180 at	12	21 60	550 at	12	66 00	– –	–	–	133 85
13	40	51 00	2	210	300 at	12	36 00	1,000 at	12	120 00	– –	–	–	417 00
14	40	45 00	–	–	600 at	10	60 00	400 at	14	56 00	– –	–	–	161 00
15	40	60 00	–	–	225 at	10	22 50	1,050 at	10	105 00	– –	–	–	187 50
16	20	30 00	–	–	300 at	12	36 00	400 at	15	60 00	– –	–	–	126 00
	Total 7¾ m.	$757 25	5	$360	5,735	–	$798 50	$8,395	–	$1,069 20	2,088	–	$866 80	$3,851 75
Add 10 per cent. for contingencies, - - - - - - - - - - - - - - - -														385 17
Total cost of preparing the bed of the road - -					$273 35 per section, or $546 70 per mile, - - - - -									$4,236 92
Total cost of lumber and iron, when placed on the road,					1,341 67 do.			2,683 34 do.						20,795 88
					$1,615 02			$3,230 04 per mile.						$25,032 80

STATEMENT—Continued.

JENNINGS'S RUN RAILROAD.

Section.		Grubbing.	Bridges.		Excavation.			Embankment.			Walling.			Total cost.
No.	Length.	Cost.	No.	Cost.	Cubic yds.	Price.	Cost.	Cubic yds.	Price.	Cost.	Perches.	Price.	Cost.	Dolls. cts.
1	40	$40 00	1	$75	720	at 12 cts.	$86 40	2,500	at 12 cts.	$300 00	–	–	–	501 40
2	40	30 00	–	–	300	at 10	30 00	850	at 12	102 00	–	–	–	162 00
3	40	35 00	–	–	350	at 10	35 00	400	at 12	48 00	–	–	–	118 00
4	40	40 00	–	–	400	at 10	40 00	390	at 10	39 00	–	–	–	119 00
5	40	40 00	1	50	600	at 10	60 00	600	at 10	60 00	500	at 30 cts.	$150 00	360 00
6	40	60 00	1	50	480	at 15	72 00	300	at 15	45 00	400	at 15	60 00	287 00
7	40	60 00	1	50	360	at 15	54 00	500	at 15	75 00	100	at 35	35 00	274 00
8	40	50 00	1	100	600	at 15	90 00	400	at 15	60 00	500	at 20	100 00	400 00
9	40	60 00	1	50	456	at 15	68 40	600	at 15	90 00	500	at 30	150 00	418 40
10	40	30 00	1	50	600	at 13	78 00	400	at 13	52 00	–	–	–	210 00
11	40	60 00	–	–	460	at 12	55 20	350	at 12	42 00	–	–	–	157 20
12	40	30 00	1	50	430	at 14	60 20	2,000	at 14	280 00	–	–	–	520 20
13	40	60 00	–	–	600	at 14	84 00	1,300	at 14	182 00	1,500	at 14	210 00	536 00
14	40	60 00	–	–	500	at 13	65 00	250	at 14	85 00	–	–	–	160 00
15	40	25 00	1	150	360	at 15	54 00	500	at 15	75 00	–	–	–	304 00
16	40	30 00	2	200	600	at 15	90 00	2,000	at 15	300 00	–	–	–	620 00
17	40	60 00	1	50	560	at 14	78 40	1,300	at 14	182 00	–	–	–	370 40
18	43	20 00	2	80	250	at 10	25 00	725	at 12	87 00	–	–	–	212 00
	Tot. 9m. 3chs.	$790 00	14	$1,055	8,626	–	$1,125 60	15,365	–	$2,054 00	3,500	–	$705 00	$5,729 60
Add 10 per cent. for contingencies,														572 96
Total cost in preparing the bed of the road,							$349 68	per section, or		$699 36	per mile,			$6,302 56
Total cost of timber and iron, when placed on the road, complete,							1,341 67	do.		2,683 34	do.			24,250 68
							$1,691 35			$3,382 70	per mile.			$30,553 24

"In submitting these statements, I would observe, that a railroad similar in declivity, length, and construction, is made use of very profitably in conveying the coal in wagons from the mines at Mauch Chunk to the boats in the canal on the river Lehigh. These wagons contain about one and a half tons each, and, when loaded, about fourteen are connected in each train, and move along the railroad by their own gravity, and descend through the nine miles (which is the length of the road) in about one hour. One man attends each train, and, by means of a check upon one wheel of each wagon, the movement is regulated to such speed as necessity or prudence may require. To each train is attached about two wagons, in which the mules ride down, for the purpose of drawing back the empty train to the mine. They have a half way place, where the descending trains stop, and renew the oil on the axletrees, and the mules are relieved on their return. Each train makes regularly five trips a day, and, in that time, delivers into the boats one hundred tons of coal.

"With respect to a comparison between the Mauch Chunk railroad and those herein treated of, it is proper to observe, that the soil on which that is located is of a very mountainous character, being on the southern declivity of a very steep mountain which is cultivated but little, except where the company have made *a half way farm*. But on Jennings's and Braddock's runs the soil is of an excellent quality, and many parts are in a state of fine cultivation, and almost every occupant has a coal mine which he is prepared to open as soon as the railroads go into operation. Appropriate maps and profiles of each subdivision of the canal and feeders, and of the railroads estimated in the preceding report, are herewith presented.

"All which is very respectfully submitted.

"NATHAN S. ROBERTS,

"*Civil Engineer, and Member of the Board of Engineers of the Chesapeake and Ohio Canal.*

"GEORGETOWN, *September* 10, 1829."

In the very interesting report on the coal trade of Pennsylvania, and, indeed, of the United States in general, so often referred to in this report, it is stated, "that the coal trade of Pennsylvania now constitutes one of the main branches of her domestic industry. It has," say the committee, "raised up, in our formerly barren and uninhabited districts, an intelligent and permanent population, and converted the mountains into theatres of busy life, and our hitherto waste and valueless lands into sites for flourishing and populous villages. Its benefits are not alone confined to those engaged immediately in the trade, but are becoming general and universal. The mineral coals of Pennsylvania now exert an influence upon every other branch of trade, and afford the means of rearing and permanently supporting, on this side of the Atlantic, all the mechanic arts and handicraft of the old world."

It is to be regretted that the length of this appendix precludes the insertion of the whole of this interesting report, but the following extracts from it will manifest, the extent and value of the coal region of Pennsylvania, so important, not to her prosperity alone, but to that of the United States in general, at the same time that they will confirm the views presented to the House in the text, as well as the appendix of this report, relative to the peculiar advantages for supplying the Atlantic seaboard with coal, which the Chesapeake and Ohio canal will derive, from the enlarged

dimensions and the extent and position of the vast field of bituminous coal in which its eastern section will terminate.

The committee of the Senate of Pennsylvania believe that the anthracite coal of that State is "confined to three fields or deposites: that of Mauch Chunk, Schuylkill, and Lykens's valley; of Beaver meadow, Shamokin, and Mahonoy; and of Lackawanna. The first commences near the river Lehigh, in Northampton county, on the east, and extends, through the heart of Schuylkill county, to Wicinisco creek, emptying into the river Susquehannah, in Dauphin county, on the west." "The *red shale*, which appears to form the base of the anthracite, and which is found to form a regular and uninterrupted circle or border around each of these deposites, does not terminate east of the river, but continues on either side of the Wicinisco creek, and is crossed by the Susquehannah immediately above Millersburg, and also below it, between the Wicinisco and Peter's mountains. A vein of coal has also been discovered in the bed of the river, opposite Millersburg, as also several small veins in the mountain on the west side, on lands of Peter Ritner, below Liverpool."

"The northern boundary is also cut through by Roush's creek, a branch of Mahantango, and also, to some extent, by the west branch of the Schuylkill, Mill creek, and a branch of Tamaqua, emptying into the Schuylkill; and by Kitchen and Room runs, two very inconsiderable streams, emptying into the Nesquehoning creek, and thus into the Lehigh. These creeks, or passes through the mountains, afford outlets for the coal, and favorable sites for the location of canals and railroads, the principal of which is the Schuylkill navigation, penetrating the first coal field at Pottsville, and extending to Port Carbon. Railroads are also located and already completed from the coal region, through nearly all these natural openings, to the different water communications; and the Mauch Chunk or Lehigh Navigation Company, with a boldness of design and magnificence of enterprise alike worthy of the cause, as characteristic of the energy and perseverance of the projectors, disregarding these natural outlets, and ascending the mountain at its greatest altitude, there enter the basin by railroad, and divert the coal from its natural channel to the waters of the Lehigh at Mauch Chunk, and thus to market by the Lehigh navigation.

"It is thus apparent that what is termed the Lehigh or Mauch Chunk coal and the Schuylkill coal are parts of the same bed or stratum, and of the same species. As we approach the eastern termination of the basin, it becomes narrower; the mountains approximate closer to each other, and the strata of coal, as at Tamaqua, five miles west of the Mauch Chunk mines, assume a vertical position. Still nearer the end of the basin, as at Mauch Chunk, they seem to have been thrown entirely over, one upon another, forming an immense mass of coal, with alternate layers of earth and slate; and from this mass they seem to diverge, widening and extending with the valley or basin, and continuing throughout its entire extent. Extending westward, it is true, the coal becomes somewhat lighter, the specific gravity of the Mauch Chunk coal being 1.494; the Schuylkill, in the vicinity of Pottsville, 1.453; and the Pine Grove, Wicinisco, and Stony creeks, about 1.400. The latter is somewhat more inflammable and easy of ignition, or to use a prevailing idea, (although there is no bitumen in it,) 'partakes more of the bituminous character.' In the vicinity of Pottsville a species of coal is found, producing *red ashes*, and

is by some regarded as of superior quality. With these exceptions there is little difference in the quality of the coal of this region; certainly no more than in trees of the same species, growing upon the same soil, or in coal taken from different parts of the same mine; and if coal of a superior or inferior quality be found in market, it is only because the vender has been more or less careful in freeing it from slate or other impurities.

"The interior of the first coal field being cut up and diversified by these various streams, running in every direction, forming several elevated summits and deep ravines, it is peculiarly fitted for extensive mining operations. The beds of coal vary from one and two to twenty-five and thirty feet in thickness; though those of from five to ten or twelve feet are considered best, as they can be worked with greater facility and profit. They can be so propped and roofed as to enable the miner to take out every vestige of coal without the slightest danger of accident, while those of twenty or thirty feet must be worked *in chambers*, and large pillars of coal left to support the roof; and even then the miner is exposed to danger from the falling of particles, and sometimes large masses. There is generally too great a quantity of superincumbent earth, to admit of their being *uncovered*, and this, as yet, has in no instance been done, excepting by the Mauch Chunk company, at the summit mines, and at a time when the science of mining was not understood. With this exception, it is the universal practice in the region to *undermine*. The beds generally, if not universally, dip in the direction of the declivity of the mountains, and the particular mode of operating in the interior of the mine is governed, in some measure, by their dip or angle. By running a tunnel or drift, and constructing a railroad, into the mountain, above the water level, of sufficient capacity to admit railroad cars, and by piercing the seam of coal horizontally for any distance that may be desired, the miners obtain full command of the whole front of the stratum, and, taking a number of *breasts*, pursue it, like a party of mowers, to the very summit or *out crop*, throwing behind them the product into the tunnel, where it is loaded upon the cars, brought from darkness into light, deposited at the landings, or precipitated at once into the canal boats. In some of the hills there are found two, three, and four seams of coal, one above another, above the water level. To what extent they continue downward, has not yet been ascertained."

"It does not appear," say the committee, "that any considerable quantity of coal was taken to market, either by the Lehigh or the Schuylkill, until 1820, when the Lehigh navigation was completed by the present company, and 365 tons delivered at Philadelphia. In 1821, 1,073 tons were brought to market, 15 tons of which were shipped coastwise. In 1822, 2,440 tons were brought to market, 180 of which were shipped coastwise.

"The year 1820 may, therefore, be regarded as the era from which we are to date the coal trade of Pennsylvania; a trade which, during the past year, (1833,) has increased to nearly 600,000 tons, amounting, in value, to about 3,000,000 dollars."

"During the past year, the Lehigh Coal and Navigation Company sent to market 123,000 tons of coal, 44,668 of which, were shipped coastwise." In a subsequent part of their report, the committee represent the present navigation of the Lehigh as admitted to be the best in the United States, and to have been constructed at an expense of $1,546,094 96. The fol-

lowing description of it is from a report of the Committee on Roads and Canals, who derived their information from the reports of the company. In that for the year 1830, the acting manager says to the Board: "The length of our line of improvement is 46¾ miles, and has cost, including the whole of the river improvement, from its commencement as a descending navigation, to its final completion, $1,558,000, the distance being divided into 36¾ miles of canal, and 10 miles of pool, with a towpath throughout the line. In his prior report, on the 12th of January, 1829, the canals intervening between the pools are described as 60 feet wide at the water line, with locks twenty-two feet wide and 100 feet long, and fed at eight separate points by substantial dams across the river. The ponds connecting the canal are cleared out in the channel fifty feet in width and five feet deep, which is the depth of the canals. The locks are of rubble work, of peculiar construction, lined with timber; the rubble stone is laid in hydraulic lime, as are all the aqueducts and culverts. The estimate of the late able superintendent of this work, makes the cost of transportation upon it, in seventy-five ton boats, plying between Mauch Chunk and Easton, at two-thirds of a cent a ton per mile, supposing a trip between Easton and Mauch Chunk to consume four a half days, and to require three men and two horses, and to return empty. (Vid. Doc. No. 101, published by order of the House of Representatives of the 17th of February, 1832, under the superintendence of the Committee on Internal Improvements.)

"The Schuylkill Navigation Company was incorporated, without mining and trading privileges, and hence it was, and, of consequence, must continue to be their interest to invite tonnage from every quarter and every source."

"This valuable improvement, one hundred and eight miles in length, was commenced in 1815, and completed at an expense of two million nine hundred and sixty-six thousand four hundred and eighty dollars and thirteen cents. Tolls were first taken, in 1818, amounting to two hundred and thirty-three dollars; and from that time until 1825, it does not appear, from the annual reports of the company, that any account was kept of the tolls on the *separate* articles of tonnage, but that the whole amounted, for the year 1824, to six hundred and thirty-five dollars. The next year, 1825, at which period may be dated the commencement of the coal trade on the Schuylkill, the tolls increased to fifteen thousand seven hundred and seventy-five dollars and seventy-four cents. Of this sum, nine thousand seven hundred dollars were received from coal. Having been designed as a grand thoroughfare for the products of the mine, the field, and the forest; as a free navigation, open to all who chose to participate in its facilities; and entering the first coal field at its centre, affording an outlet for the coal of more than half its territory; individuals of capital and enterprise were attracted to the scene, and railroads constructed, diverging in all directions to the mines. Laborers and mechanics of all kinds, and from all nations, thronged to the place, and found ready and constant employment. A new era seemed to have dawned in the mountains. The wilderness was subdued. The coal basin seemed to be literally running over with active and resolute adventurers; a rapidly growing population became established; the wild animal was driven back to give place to a host of miners, who now pierce its thousand hills. So that, for the last year, 1833, (only eight years from the commencement of the coal trade on the Schuylkill,)

the tolls on the canal amounted to three hundred and twenty-five thousand four hundred and eighty-six dollars and sixty-three cents. Of this sum, two hundred and twenty-eight thousand one hundred and thirty-eight dollars were derived from the article of coal alone. Houses, many of which are costly and splendid, and towns, the principal of which is Pottsville, sprang up in various parts of the region. Coal lands, the basis of all this promising superstructure, grew rapidly in value. Being owned by numerous individuals, or yet remaining the property of the State, and considered until now scarcely worth the taxes, they were eagerly sought after, and presented strong inducements for the investment of capital. Sales were made to a large amount; it being now estimated that four millions of dollars have been invested in lands in the first coal district. Many individuals purchased lands and removed upon them with their families, designing to convert them into permanent residences, and, as the farmer cultivates his farm, to prosecute the mining business with their own hands and their own means. Other lands are held by capitalists, some residing in the district, and some at a distance, the mining operations being carried on by tenants. Associations of individuals, forming joint stock companies, having obtained charters for the mining of coal from the Legislatures of other States, also purchased lands, which, to evade the statutes of *mortmain*, declared to be in force in Pennsylvania, were held in virtue of deeds of trust, and were used and occupied by those companies. Two of them, viz. the Delaware Coal Company and the North American Coal Company, were incorporated for the term of five years by the Legislature, at its last session, when an act was also passed escheating the lands held by companies under charters granted by other States, without the license of this State. The others either cease to exist, or operate in the capacity of individuals.

"Capital was thus introduced by indviduals and by incorporated companies, and important public improvements made by both. The country has grown and flourished beyond example. The farmer shared alike the general prosperity in the new, convenient, and certain market for all his produce. In the midst of this hum of industry, this tide of prosperity and flow of capital, it were not to have been expected that a spirit of *speculation* should have remained entirely dormant, or that all who purchased lands did so with the *bona fide* intention either of occupying them themselves by actual resident settlement, or of realizing their expenditures from the product of the mines. Hence, a fictitious value was sometimes given to coal lands. Calculations being made to ascertain the number of *square yards* of coal contained in an acre of land and its value; and some calculating also the quantity that each acre was capable of producing, without either knowing that it contained coal at all, or counting the cost, labor, and expense of producing it, the adventurer conceived the sum of one, two, or three hundred dollars per acre a very inadequate price. The few who thus ran into error and extravagance, and purchased lands under these impressions, and with these expectations, (and it is rather a matter of surprise that the number was not greater,) were compelled either to lose money themselves, or impose their losses upon others. They were, therefore, interested in producing fluctuations and uncertainty, rather than steadiness and certainty, in the coal market. Their fortunes could not be injured by the most sudden change, but might possibly be benefited; and if a supply of coal were one year withheld, in order that the price might advance to ten, twelve, or fifteen dollars per ton, data would be afforded for another

estimate of the value of their lands by the square yard of coal, and the owner again realize, and perhaps double, the amount of his purchase money. These, however, are of the things that have been, and, it is believed, have now passed away. It is not now in the power of the speculator seriously to affect, nor of the monopolist permanently to control, the coal trade of Pennsylvania. This mineral is happily too vast, and the facilities for transporting it to market too numerous and diversified, to be grasped by the hand of the one or the other. At one time, and but a few years since, this might have been done, had the localities of our coal deposites been accurately known. But this knowledge was imparted in proportion as the interest or ambition of one impels him ahead of another, and as necessity leads to invention and discovery; and it is not now probable that such a state of things will ever occur. So long as the wealth, the enterprise, the intelligence, and the patriotism of our citizens cannot be concentred in the few, but are equally distributed among the many, and equality of rights continues to form a fundamental principle of our Government, it must remain as their common heritage, constituting a large portion of the present wealth of the State, and her principal strength in after ages. New mines are developed as the consumption of coal increases; and the spirit of improvement and rivalry is abroad seeking to supply the demand. Competition is the grand alembick in which the health of trade is purified and preserved, and, in relation to the coal trade, if allowed to pursue its true and legitimate objects, unfettered and unrestrained, uncontrolled by injudicious legislative enactments, it will, as in all other cases, produce uniformity, regularity, and certainty, and a safe guaranty for the investment of capital and the expenditure of labor.

"The following statement comprises the different canals and railroads at present completed in the first coal district, and connected with it, as also an estimate of the value of other property and improvements necessarily employed in carrying on the coal trade:

	Miles.	*Cost.*
Lehigh navigation, - - - -	46	$1,546,094 96
Former river improvements, - - -	-	155,420 00
Railroad to summit mines and laterals, -	16½	59,766 39
Room Run railroad, - - - -	8¼	123,000 00
Schuylkill navigation, - - - -	108	2,966,480 13
West Branch railroad, - - -	15	185,000 00
Lateral roads connected with the above, -	10½	31,500 00
Norwegian or Mount Carbon railroad, -	9	95,000 00
Laterals connected with the above, - -	1¼	5,250 00
Mill Creek railroad, - - - -	4	15,000 00
Laterals connected with the above, - -	7	11,700 00
Schuylkill Valley railroad, - - -	10	60,000 00
Laterals connected with the above, - -	11½	19,200 00
Navigable feeder of the Union canal and dam,	21	164,364 38
Pine Grove railroad, made by Union Canal Company, - - - - -	4	20,561 25
Continuation of same by individuals, -	2½	7,500 00
Lykens's Valley railroad, - - -	16	90,000 00
Little Schuylkill or Tamaqua railroad, -	20	225,557 11
Lateral branches, single, double, and treble tracks,	6½	

To the above might also be added the Delaware division of Pennsylvania canal, - -	60	1,430,211 85
Total,	377	$7,211,606 07

Number of wagons or railroad cars in the first district, 2,354, at $70 each, - - - - -	$164,780 00
Boats employed by individuals and companies, 980, at $500 each, - - - - - -	490,000 00
92 colliery establishments, including working capital, utensils, horses, mules, &c. at $4,000 each, - -	490,000 00
100,000 acres of land, at $40 per acre, - - -	368,000 00
	4,000,000 00
	$5,022,780 00

"The whole amount of coal taken to market from this district during the last year, 1833, is 399,933 tons, to wit:

On the Mine Hill and Mill Creek railroad, - -	37,074 tons.
Mine Hill and Schuylkill Haven railroad, -	77,073
Schuylkill Valley railroad, - - -	23,479
Mount Carbon railroad, - - - -	73,136
Little Schuylkill or Tamaqua railroad, - -	37,506
By individuals not using railroads, - - -	6,665
Mauch Chunk, or Lehigh navigation, - - -	123,000
Pine Grove, on Union canal and in wagons, - -	12,000
Lykens's Valley, - - - - - -	10,000
Total,	399,933
To the above may be added for home consumption and the supplies of the adjacent country, about - - -	30,000
Making the total mined, consumed, and sent to market in the first district, - - - - -	429,933 tons.

"The borough of Pottsville contains at present a population of about four thousand souls, and upwards of five hundred dwellings. It is valued at one million of dollars. Port Carbon is also a place of considerable commercial importance—is valued at three hundred thousand dollars, and does a coal business nearly equal to that of Pottsville. The towns of Schuylkill Haven and Minersville are estimated at two hundred and fifty thousand dollars each, and their coal trade is about equal to that of Pottsville. The towns of Mauch Chunk, Summit Hill, Tamaqua, Patterson, Tuscarora, St. Clair, Newcastle, Middleport, Mount Carbon, Pine Grove, Coal Castle, Llewellyn, and other small towns, exclusive of the huts and cabins occupied by the miners and laborers, may be estimated at a million and a half, making the total valuation of the towns in the first district three millions of dollars. Of the canals and railroads above stated, 279¾ miles were made by individuals and incorporated companies not having mining privileges, at an expense of $5,257,187 61; and 97¼ miles by incorporated companies having mining privileges, at an expense of $1,954,418 46. The Delaware division of the Pennsylvania canal was made by the State.

"*The second, or Beaver Meadow, Shamokin and Mahonoy coal field.*

"The particular localities of this coal field are not so well defined as those of the first and third. Occupying the summit, or highest ground between the waters of the Lehigh and Schuylkill and the Susquehannah, in the midst of the dense chain of mountains, extending across the entire country between these streams; and being consequently further removed from the Eastern market, it has not been so fully explored, nor its resources so extensively called into requisition. Sufficient information upon the subject is possessed, however, to enable us to trace its general features, and to justify the belief that it is a distinct and independent formation, forming, as it has recently been termed, the 'back bone' of the anthracite coal deposite of Pennsylvania. It is also equally susceptible of access; and if the improvements now contemplated and in progress in this region be completed, and the measures hereafter suggested by the committee be adopted, its mineral wealth can be thrown into market upon terms equally favorable.

"The second coal field lies at an average distance of about ten miles north of the first; runs laterally with it, ranging nearly an east and west course, is about the same in extent of miles, and apparently similar in its geological character. It is enclosed or bounded by a continuous range of double mountain barrier, commencing about three miles west of the Lehigh, and ending in the forks of Mahonoy creek, in Northumberland county, about five miles east of the Susquehannah. The mountain by which it is thus enclosed, assumes various names, from the fact that different streams pass through it, or from other local circumstances. On the south it is called the Spring mountain, which continues to the western extremity of the field, where it is called the Mahonoy and Bear mountain. On the north, it is called Mount Yeager, Buck mountain, Catawissa mountain, Shamokin mountain, Zerby's retreat, &c. &c. This chain or boundary is preserved at the western end of the basin, and also on the north and south, so far as it has been traced, with surprising regularity, interrupted only by the streams that break through it. The eastern end seems to be more irregular, the boundary being broken into fragments, and various small streams flowing through it into the Lehigh. The outer base, like that of the first coal field, exhibits a *red shale* margin, extending entirely around the field, and marking its extent with great precision. At the east end it is penetrated by Beaver Meadow creek, and Hazel run, emptying into the Quakake, and also by Laurel run, Sandy creek, Terrapin pond creek, and other small streams, all emptying into the Lehigh, and affording outlets, by railroad, for the coal of that part of the field lying between the Lehigh and the summit formed by the head waters of Tamaqua and Beaver Meadow creeks, embracing an area of about fifteen miles in length, and from five to six miles in width. On the north, it is broken through by Black creek, a branch of Nescopeck, Cattawissa, Roaring creek, Shamokin, and Zerby's brook, a branch of Mahonoy. On the south it is broken through below Girardville, by Big Mahonoy, which passes along the south or outer side of the boundary, to its western termination, in Northumberland county, where it leaves it, and falls into the Susquehannah. It may therefore be said that there is no direct southern outlet from this district, the Mahonoy running west into the Susquehannah, and the Beaver Meadow creek east, into the Lehigh. The Broad mountain runs the entire distance from the

Lehigh to the Susquehannah, separating the first and second coal fields, and although considerably depressed by the west branch of the Schuylkill, above Coal Castle, as well as at some other places, it is broken through only by the head waters of Tamaqua; and perhaps this valley will, in time, afford the most eligible route for that portion of the coal of the district, west of the Beaver Meadow summit, and east of Girardville. The Tamaqua and Beaver Meadow creeks rise within the short distance of one hundred and thirty-two feet of each other; and the whole ascent from the Beaver Meadow mines to the summit or top of Spring mountain, is two hundred and sixty feet, and the descent from thence to the town of Tamaqua, at the commencement of the Little Schuylkill railroad, one thousand and twenty feet. The mind of man is not, however, in this age of improvement, confined to ravines, nor the meanderings of crooked streams. No obstacle that nature has placed before him seems to be regarded, and accordingly we find railroads constructed over our highest mountains, and others in progress, running not over one mountain only, but crossing transversely all the mountains interposing between the waters of the Schuylkill and the Susquehannah, and the Susquehannah and the Lehigh. The Danville and Pottsville railroad, designed to connect the Schuylkill navigation at Pottsville, with the Susquehannah at Danville, and the Pennsylvania canal basin at Sunbury, was projected in 1826, and is now completed as far as Girardville, on the Mahonoy creek, about ten miles north of Pottsville. The death of its chief patrons, the late Stephen Girard, who subscribed two hundred thousand dollars to the stock of the company, and Gen. Daniel Montgomery, with whom the project originated, has retarded for a time the completion of the work. When finished, it will pass through the heart of the first and second coal fields. The most difficult part of it, including the tunnel and inclined planes, is now completed, and will be ready for the transportation of coal, as soon as the mines on Mahonoy, now owned by the city of Philadelphia, shall be fully opened. From Girardville, this road will run a westerly direction; and from the Shamokin summit, pass some eight or ten miles farther through the coal beds of this region, and following the valley of Shamokin, intersect the basin of the Pennsylvania canal at Sunbury, thus affording another and most important avenue for tonnage to that canal. It will therefore be used, not only for the transportation of coal from the mines on either end, and to different markets, but as a grand thoroughfare for the merchandise, produce, general traffic of the country, and the agricultural supplies of the vast and rapidly increasing population of these two mineral districts; and when the spirit of liberality shall be as willing to allow, as public policy is now to dictate, the propriety of a free communication to the Chesapeake, the mineral treasures of Shamokin and Mahonoy will be found to contribute their full share to the wealth of the State, and the prosperity of her citizens.

"This road being the only improvement yet completed in the second coal region, there has been no coal taken from the district to the Eastern cities, excepting small quantities for the purpose of proving its character and quality. Several beds have been exposed in different parts of the basin, from which the blacksmiths and the neighboring country have for many years been supplied. No doubt exists either as to the excellence of its quality, or its abundant quantity. It differs slightly, in its general appearance, from the coal of the first district; that of the western end, on Shamokin and Mahonoy, being very brittle, of a shining black color, combustible, and exhibiting appearances resembling the *growths* of wood; while that of

the eastern end, at Beaver Meadows, or a considerable portion of it, is *undulated* and of *conchoidal fracture*. It burns freely, some portions of it, (as in the first and third districts,) producing *white*, and others *red* ashes. The beds, so far as exposed, dip to the southwest, and some of them appear to be of extraordinary thickness. The mine now opened on Zerby's run, or Mahonoy, known by the name of the Oyster bed, when first discovered, presented, in an abrupt and steep precipice, jutting into the creek, the appearance of several strata of coal, with intervening earth and slate; but upon excavating these different strata, the intervening layers of earth were observed to grow thinner, and at a short distance to run out, leaving an unbroken body of coal, without any admixture, of fifty feet in thickness above the water level. There are other beds also on Coal run, and Shamokin creek, twenty-seven and thirty feet in thickness. The Beaver Meadow Company's mine is about twenty-seven feet in thickness above water level, with small intervening strata of slate, and it has been traced to the depth of twenty-one feet below water level, without encountering any admixture, or reaching the floor. Other beds are found to be no more than three and two feet, and some ten, twelve, fifteen, and twenty feet in thickness. The basin has not been sufficiently examined to justify an opinion as to the precise thickness of the different strata. It is generally believed they are larger than those of the first district; yet it is possible that, upon more minute examination, they may prove not materially different."

The lockage between Mauch Chunk and Bristol, on tide water, eighteen miles above Philadelphia, is five hundred and twenty-four feet, the distance one hundred and six miles; but the sixty miles between Easton and Bristol is a State canal, the locks and trunks of which are of different dimensions from those on the Lehigh canal, and calculated for boats of less breadth and tonnage. The surface of the State canal is but forty feet.

The rate of toll charged on coal, by the State on its portion of this line, is "half a cent a ton per mile, or thirty cents from Easton to Bristol." That charged on the forty-six miles between Easton and Mauch Chunk, prior to 1834, was one dollar and three cents a ton. It has been reduced, in the present year, to seventy-three cents, which is two cents a ton per mile on the thirty-six and a half miles of various canals embraced in the line of forty-six miles of navigation. A very interesting paragraph of this report gives the following description of the plan and cost of the Lehigh navigation.

The committee say, after a comprehensive view of the interest of Pennsylvania in the extension of the Lehigh navigation above Mauch Chunk, "the State ought to own the Lehigh canal, for another reason. The Delaware division of the Pennsylvania canal, from Easton to Bristol, sixty miles, cost the State one million four hundred and thirty thousand two hundred and eleven dollars and eighty-five cents, the annual interest of which, at five per cent. is seventy-one thousand five hundred and ten dollars and fifty-nine cents. The Morris canal, commencing on the opposite side of the river, as also the Delaware and Raritan canal, and other improvements contemplated in New Jersey, will be found greatly to increase the coal trade of the Lehigh. By uniting the Lehigh and Delaware canals, a proper share of this trade would be secured; and there can be no doubt that in a few years the coal alone will pay the interest of the whole sum invested in both canals. In 1832, the Mauch Chunk Company paid to the State in tolls on the Delaware canal, seventeen thousand six hundred and forty-six dollars and sixty-one cents, and in 1833, notwith-

standing the breaches in the canal forced many thousand tons to take the river in arks, thirty-one thousand nine hundred and forty-one dollars and sixty-eight cents, a sum nearly equal to half the interest of its original cost. The Lehigh navigation is admitted to be superior in all respects to any other work of a similar nature in the United States. The work is executed in the best manner, and its banks have now become solid and permanent, and, of course, will require but little repairs. It is forty-five feet at bottom, sixty feet at surface, and contains five feet depth of water. Its locks are twenty-two feet in width and one hundred feet clear in the chambers, and are calculated for single boats of one hundred and fifty tons, or double boats of seventy-five tons burden. It is forty-six miles in length, with forty-seven lift and six guard locks, and nine dams. The whole lockage from Mauch Chunk to low water in the Delaware at Easton is three hundred and sixty feet. Its original cost, including damages, &c. is one million five hundred and, forty-six thousand ninety-four dollars and ninety-six cents, and, including former river improvements, upper and lower sections, clearing channels, &c., one million eight hundred and seventy-two thousand six hundred and ten dollars and eighty-seven cents. The same work would perhaps have cost the State double this sum."

"The third, or Wyoming and Lackawanna coal field, is situate wholly in Luzerne county, and constitutes about one-fifth of its territory. Occupying a central position in the county, it bears nearly an east and west course, and terminates near the line of Wayne county on the east, and Columbia county on the west. Like the first and second coal fields, it is confined between two parallel mountains, or rather enclosed by a continuous mountain, extending entirely around the coal deposite. It is about sixty-five miles in length, averaging about five miles in width. Being widest at the centre, and growing narrower as the barrier or boundary contracts towards either end, it assumes, like the other fields, the shape of a longitudinal trough, or canoe. Its boundary is progressively termed the Moosick, Lackawanna, Dial, Wilkesbarre, Nanticoke, Shickshinny, and Capous mountains. The coal beds of this region vary from one foot to thirty feet in thickness, and are generally more accessible than those of the other fields, being exposed in innumerable places, by deep ravines, abrupt precipices, and small streams, and in some places form the bottom of the river Susquehannah and the Lackawanna. The Pennsylvania canal passes through them at several points, and at others the coal may be precipitated from the mines by means only of a chute or slide of boards directly into the canal boats.

"This coal formation is well defined, and its geological character more extensively and advantageously known than that of either of the other regions, having recently been explored by Professor Silliman, a gentleman of eminent science and intelligence. The strata would appear to run tranversely across the valley, forming a series of elliptical curves, and dipping from either side of the boundary in the direction of the waters. The coal is heavier and harder than that of the other two deposites. Arks, laden with this coal, have been known to sink in the Susquehannah, which, after remaining under water until the freshet had subsided, has been taken out without sustaining any loss from decomposition. It is generally thought to be not quite so free of ignition, but when ignited, the heat is intense, and its endurance greater."

"The river Susquehannah breaks through the northern boundary of this

field at Pittston, about ten miles above Wilkesbarre, and, pursuing its way through the middle of Wyoming valley, it passes lengthwise through the centre of the coal range, until it reaches the mouth of Tilberry creek, or the Nanticoke falls, a distance of about nineteen miles. It here passes out of the field to the north, and breaking through or rather severing lengthwise the northern boundary for the distance of several miles, to the mouth of Shickshinny creek, it there again turns to the south, again enters the coal field, and, running across it, passes through the southern boundary, leaving undisturbed the western end of the coal deposite. Several successive beds of coal have been opened in the mountain at this point, by Nathan Beach, Esq., the strata appearing regular and uninterrupted. The third field here terminates, falling off into a *red shale* basin at the *Knob mountain*, near Fishing creek, in Columbia county, and not, as has generally been supposed, at the falls of Nanticoke."

"Coal, during the past and present seasons, has been hauled in sleds and wagons from this district, a distance of eighty miles and upwards, into the State of New York, and sold in some instances for *twenty* dollars a ton. The iron works of a Mr. *Williams*, of Jamestown, at the southeast end of Chautauque lake, are now supplied with Lackawanna and Mauch Chunk coal, which is transported from the city of New York to Albany, one hundred and sixty miles; from Albany to Buffalo, three hundred miles, and thence hauled in wagons to Jamestown, seventy miles, and within seven miles of our State line. If we add the distance from Carbondale to New York, two hundred and seventeen miles, we have a total distance of seven hundred and forty-seven miles from the mines to the place of consumption. This fact demonstrates as well the utility of canal transportation, as the value of this mineral."

"A railroad from the Lackawanna, by Starucca creek, to Harmony, in Susquehannah county, designed to connect with the Utica and Binghamton or Chemung canal, is projected, and it is believed will be constructed. This will afford a direct and advantageous outlet to the north for the coal of the Lackawanna. During the past season two thousand five hundred tons of coal were conveyed by this route in sleds, and sold at various places in the interior of New York, for about sixteen dollars per ton. It is estimated that there exists now in the western part of New York a market for at least one hundred thousand tons of coal yearly. If this demand could be supplied, there would, in a very few years, be a market for double and treble that quantity.

"It only remains for the committee to notice, in connexion with the third coal field, one of the most important improvements, considered in reference alone to the coal interests, in the Union. In 1822, *Maurice* and *John Wurtz*, conceiving the bold and expanded project of constructing a railroad and canal from the coal beds on the Lackawanna, near the eastern termination of the field, to the North river, in the State of New York, obtained, in 1823 and 1825, acts of incorporation, and succeeded in forming the Delaware and Hudson Canal Company, who undertook, and completed this Herculean enterprise. The country was then a dense and apparently impenetrable wilderness. The footstep of man had scarcely marked the spot where is now erected the flourishing and beautiful village of Carbondale, containing a population of twenty-five hundred souls. The Moosick mountain, towering eight hundred and fifty-five feet above the level of the Lackawanna, which, to ordinary minds, would have pre-

sented an insurmountable barrier, and bid defiance to individual enterprise, dwindled in the eye of science to a molehill, and presented no impediment in the way of a powerful and adventurous company. They have constructed a railroad from the Lackawanna to the Lackawaxen, a distance of sixteen miles, overcoming the mountains by means of eight inclined planes; 'five of them ascending planes, worked by stationary steam engines, and three of them descending planes, acting by gravity.' From the termination of the railroad at Honesdale, in Wayne county, (another town which has sprung up solely under the auspices of the company, and now containing fifteen hundred persons,) a canal is continued down the Lackawaxen to the Delaware, and from thence through the State of New York to Rondout, on the North river, ninety-four miles above the city of New York, a distance of one hundred and seven miles. Whole length of canal and railroad, one hundred and twenty-three miles. This work was completed in 1829, at an expense of two million three hundred and five thousand five hundred and ninety-nine dollars and fifty-three cents, and in the various results produced, furnishes one evidence of benefits conferred by an incorporated company, which would otherwise never had existence; and exempts this company from the general objections resting against corporate bodies, having mining and trading privileges. Without an act of incorporation, and the inducements of mining privileges, this country, now filled with an active and enterprising population, and furnishing one of the best markets in Pennsylvania, would have remained for many years, perhaps, a barren waste, and possibly it would not be going too far to say that the coal of Lackawanna would never have found a market by this route, or in this direction. Like the Lehigh Company, they have disregarded the great mountain barriers, dividing the waters of the Susquehannah and the Delaware, and conducted the coal of the third field from its natural, but more circuitous channel, directly to the city of New York, and the other increasing markets of the East and the North. In 1833 this company sent to market one hundred and eleven thousand seven hundred and seventy-seven tons of coal, and made a dividend of seven per cent. upon their capital.

"This work affords also a new outlet for the vast lumber trade of the northern counties. During the last year, about five millions of feet of lumber were conveyed upon the railroad from Carbondale to the Lackawaxen and the Delaware, where it is rafted down the river. But the committee are prevented from performing the pleasing task of dwelling longer upon this noble work, and its general beneficial effects upon the prosperity of the country in which it is located, by the very interesting letter of *John Wurtz*, Esquire, President of the company.

"It is impossible now to form an estimate of the small quantities of coal that have been conveyed in arks down the north branch of the Susquehannah. Recently, and since the completion of the Pennsylvania canal, preparations have been made for carrying on the business more extensively. The Baltimore Company have purchased several of the most valuable beds in the vicinity of Wilkesbarre, and contemplate the construction of railroads from the mines to the canal. The Plymouth mines are extensively opened, about ten thousand tons having been sent from them to market during the last year.

"The whole amount of coal mined in this part of the third coal field,

and sent to market by the river and canal, and used for home consumption, has been estimated at	30,000 tons.
By the Delaware and Hudson Company,	111,777
Home consumption, used in steam engines, and sold at intermediate places,	20,000
Total in third field,	161,777 tons.

"The following estimate of the value of property employed in the coal trade, and towns consequent upon it, is believed to be not materially erroneous:

Colliery establishments, utensils, horses, &c.	$90,000
Canal boats and railroad cars	157,500
Carbondale	250,000
Honesdale	125,000
Capital invested in coal lands, &c.	240,000
Total	$862,500

"To the above may be added the value of vessels employed in the shipping of coal, *nine hundred* of which were loaded at Rondout, during the last year.

"The three anthracite coal deposites of Pennsylvania are about sixty-five miles in length, and five miles in width, embracing an area of three hundred and twenty-five square miles, or two hundred and eight thousand acres each, making an aggregate of nine hundred and seventy-five square miles, or six hundred and twenty-four thousand acres. Some of the lands in the first district are worth three and four hundred dollars an acre; others are of less value, and some parts worth little or nothing. The lands in the third field, being generally valuable as well for mining as agricultural purposes, may be valued at an average rate of thirty dollars per acre; and taking the whole three districts together, it is believed twenty dollars per acre is not too high a valuation. At this rate, our anthracite coal fields are worth twelve million four hundred and eighty thousand dollars.

"*Estimate of the value of improvements, and property connected with and consequent upon the anthracite coal trade of Pennsylvania in the great coal fields.*

Railroads and canals made by companies and individuals, including also parts of the State canals, four hundred and eighty-nine miles	$9,750,937 42
Collieries, boats, cars, &c. &c.	1,270,280 00
Capital invested in coal lands	4,900,000 00
Mining capital	480,000 00
Value of towns in the coal fields	3,375,000 00
Total,	$19,176,217 42

"To the above may be added the value of storehouses, wharves, landings, &c. &c. in Philadelphia, New York, and other places; and also the value of vessels, and capital employed in shipping coal. The additional value of coal, after leaving our ports, is to be offset against the interest of this sum.

"Whole quantity of anthracite coal mined and sent to market in Pennsylvania, during the year 1833.

From the first coal field - - - -	429,933	tons.
second do. - - - -	500	"
third do. - - - -	161,777	"
Total,	592,210	tons.

"In forming an estimate to ascertain whether the profits on this quantity of coal will pay the interest of the sum invested in the business, the cost of coal lands now occupied, and railways and canals constructed, should alone enter into the calculation. Large bodies of coal lands, particularly in the second field, have been purchased, and large sums of money invested, not with the view of immediate, but future profit. That portion of the State improvements, included in the above statement, should also be omitted, as they depend alike upon other sources for tonnage. The coal above stated has drawn from the community the average sum of five dollars per ton, or a total of two million nine hundred and sixty-one thousand and fifty dollars. The actual expense of mining and transporting five hundred and ninety-two thousand two hundred and ten tons of coal may be estimated at four dollars per ton, amounting to two million three hundred and sixty-eight thousand eight hundred and forty dollars. This expenditure, however, includes the tolls upon the improvements, which are not a charge, but constitute receipts upon the capital invested. It is, therefore, proper, as interest is calculated upon the sum invested in the canals and railroads, to omit the item of tolls, which would allow on each ton of coal about two dollars over and above the expense of mining and transportation, thus :

	Cost.	Interest at 6 per cent.
Canals and railroads,	$5,781,394 22	$346,893 65
Coal lands in use,	1,740,000 00	106,400 00
Total	$7,521,394 22	$453,293 65
Profits on 592,210 tons of coal, at $2 per ton		$1,184,420 00
Excess of profits beyond the interest - -		$731,126 35

"Again, if we take the whole sum of nineteen million seven hundred and fifty thousand nine hundred and twenty-seven dollars, including the cost of portions of the State improvements, and the value of the towns, the interest at six per cent. will amount to the sum of $1,186,573 02
Deduct profits on 592,210 tons of coal - - 1,184,420 00

Deficiency to pay the interest on the whole sum invested, only - - - - - - $2,153 02"

The committee next proceed to describe the bituminous coal field of Pennsylvania. "Nature," they say, "in the disposition of her bounties, seems to have bestowed upon Pennsylvania more than a due proportion of the treasures of the mineral kingdom. Great and valuable as are her anthracite deposites, and rich and abundant as are her mines of iron ore and

other minerals, her bituminous coal region is still more extensive and inexhaustible.

"The great secondary deposite, extending, as it is generally believed, from the Hudson to the Mississippi, and to the Rocky mountains, is in Pennsylvania limited by the Alleghany mountain, which appears to form the barrier or dividing line between the anthracite and bituminous coal beds, or between the transition and secondary formations. The union or junction of these formations is plainly and distinctively marked in the ends of the mountain where the west branch of the Susquehannah breaks through it, above Bald Eagle, the latter resting against the former, and forming the basin in which the bituminous coal, in regular and successive strata, is deposited. This coal field is, therefore, confined to the west side of the Alleghany, and is supposed to extend to the centre of the mountain. In the southeast corner of Somerset county, in Southampton township, and in the western parts of Bedford and Huntingdon counties, it would appear to extend to the southeast of what is there called the Alleghany, and occurs in great abundance on *Wills's creek*, *Jennings's creek*, *Gladwin's run*, &c. emptying into the Potomac. The chain of mountains called the Alleghany, above Bedford, is very wide, and large mountains diverge from it; and although the mountain running through Somerset, and dividing the waters of Youghiogheny and Conemaugh from those of the Potomac, may be the largest, it seems most probable that *Wells's* or *Evett's*, or possibly *Sideling* mountain, there forms the boundary of this deposite, and, upon examination, will be found to exhibit a continuation of the same characteristic feature between the secondary and transition formations.

"The bituminous coal beds vary from one foot to twelve feet in thickness, but rarely exceed six feet. They lie in nearly horizontal strata, with about sufficient dip to free the mines from water. Some hills contain three and four beds, with alternate layers of earth and slate, and rest between a firm and smooth slate roof and floor. *Faults* or *troubles* are seldom met with, and in this they differ from the anthracite, and go far to confirm the opinion, that all this vast extent of secondary rocks was once the bottom of a great lake or sea, and that it suffered little if any interruption from the gradual discharge of its waters through its distant and widely extended boundary. It has evidently been drained by the Mississippi, the St. Lawrence, the Susquehannah, and the Hudson; and it is a curious and interesting fact that near the northern termination of this coal field, in Potter county, the head waters of the Alleghany, the Susquehannah, and the Genesee rivers, flowing into the Gulf of Mexico, the Chesapeake, and the St. Lawrence, take their rise in an area or space of about five miles.

"With the exception of the Susquehannah and its tributaries, and Wills's creek, emptying into the Potomac, all the streams rising in the coal field, west of the mountain, flow into the lakes, or into the Ohio river, and consequently the ground falls off or recedes in the same direction, and becomes too low, as it is generally supposed, to contain the coal measures. Its northern termination or boundary may be traced from the head waters of Towanda creek, in Bradford county, thence across the high lands or dividing waters of Tioga, Potter, McKean, Warren, Venango, &c. to the Ohio State line. The Tioga river and its tributaries penetrate the coal field in the vicinity of Blossburg and Wellsborough, in Tioga county. A recent and interesting mineralogical report upon this region has been made by *R. C. Taylor*, a practical engineer and geologist, for the Blossburg Railroad Com-

pany, in which it is satisfactorily shown that the coal runs out as the streams decline to the north. 'There would need (says the report) a total height of mountain of five thousand one hundred and twenty-five feet at the State line, between New York and Pennsylvania, to contain the coal measures; whereas, the hills there are probably below six hundred feet altitude. This calculation is entered into with a view of showing the futility of the expectation, not uncommonly expressed, of tracing these coal beds in a northerly direction beyond the limits at which they are at present discoverable.'

"This field being bounded on the south by the Alleghany mountain, extending into the State of Virginia, and westward, coal may be said to be present, to a greater or less extent, in all the western counties, with the exception of the county of Erie, in which it has not yet been discovered. The counties of Bradford, Lycoming, Tioga, Potter, McKean, Warren, Crawford, Bedford, Huntingdon, and Centre, lie partly in, and partly out of, the coal field. The counties of Alleghany, Armstrong, Beaver, Butler, Cambria, Clearfield, Fayette, Greene, Indiana, Jefferson, Mercer, Somerset, Venango, Washington, and Westmoreland, are wholly within its range, and embrace together an area of about *twenty-one thousand* square miles, or *thirteen million four hundred and forty thousand* acres.

"The west branch of the Susquehannah, taking its rise in Cambria and Jefferson counties, passes through the heart of the rich coal deposites of Clearfield county, and breaks through the Alleghany mountain above the mouth of Bald Eagle, thus affording an outlet to the Eastern markets for the coal of that region. It is navigable for arks from the Cherry tree, or mouth of Chest creek, in Clearfield county, one hundred and twenty-five miles above the present termination of the Pennsylvania canal, at Dunnstown. Pine creek, and Lycoming creek, have also their source in the coal field, and afford outlets for the coal to the Susquehannah; and to these three points we must look, mainly, for our eastern supplies of bituminous coal."

The committee err in supposing, as they manifestly do in the preceding, as well as a subsequent part of their report, that "Wills's creek, emptying into the Potomac, is the *only stream* flowing through the bituminous coal field, east of *the Alleghany*." Not only the preceding extracts from the report of Messrs. Roberts and Cruger, on the coal mines of George's and Savage creeks, branches of the Potomac, the most remote of which is 30 miles above Wills's creek, demonstrate the fact that bituminous coal is as widely diffused on both sides of the Potomac as on the head waters of the Susquehannah; and from indications of its existence, in other portions of Virgina, west of the Blue ridge, as widely through her entire mountain region, which is the broadest and most diversified in the United States. Anthracite coal has been found on the side of the Chesapeake and Ohio canal in narrow seams, of from half an inch to three inches in thickness along the cliffs of freestone immediately above Seneca creek, within twenty-four miles of Georgetown. Those seams were opened on cutting the canal, but no experiment has been since made by the proprietors of the adjacent lands to ascertain whether they enlarge as the rock extends to the north, or whether there is any large deposite of coal in the vicinity.

In the county of Berkley, in Virginia, about the same distance by the Potomac from tide water, as Mount Carbon, by the Schuylkill, and Mauch

Chunk, by the Lehigh and Delaware, an extensive field of anthracite coal has been recently discovered, in a situation favorable to its connexion, by a descending railway, with the Chesapeake and Ohio canal. Its extent may be inferred from the annexed letters addressed to the chairman of this committee by Thomas F. Purcell, Esq., a resident engineer of the Canal Company, who has, for some time resided at Williamsport, opposite to the the county in which this discovery has been made:

ENGINEER'S OFFICE,

Williamsport, May 3, 1834.

DEAR SIR: I regret that the occurrence of untoward, and indeed unexpected circumstances, have operated to retard the examinations I had purposed to make in the newly discovered region of anthracite coal, of Berkly county, Virgina. The existence of a considerable deposite of this valuable mineral adjacent to the waters of the Potomac, is now sufficiently ascertained to place it beyond controversy. The quality of the coal has been pronounced by those well acquainted with the subject, quite equal to that obtained in Pennsylvania.

Individual enterprise has already been directed to this interesting subject, and before many months the position and extent of the mineral deposites will be ascertained by the efforts of a few enterprising men. Although a railroad may, and will be built, to bring this coal to the river, yet it will militate much against the operation, unless the canal is extended up the river to a point opposite that at which the coal must be landed; for the cost of the mineral in market will be considerably enhanced, if it is subjected to the expense and inconvenience attending its transhipment from a common river to a canal boat.

The extent of the region is, as yet known, about fifty-four square miles. In the same vicinity there exists iron ore, and tripoli, or rotten stone, in considerable abundance.

Very respectfully,
Your most obedient,
THOS. F. PURCELL, *Engineer.*

Hon. C. F. MERCER.

WILLIAMSPORT, *May* 8, 1834.

DEAR SIR: In reply to your letter asking additional information on the subject of the anthracite coal district, lately discovered near the Potomac, you are informed that the coal field now known to exist, lies partly in Berkley, and partly in Morgan counties, Virginia.

The nearest coal of which any thing is known, is nine miles from the river, and it has been traced nine miles further back. The field embraces Third Hill and Sleepy creek mountains. A railroad eighteen miles long, costing $90,000, would bring this coal down Meadow branch to the river. The country is favorable for such a road, and abounds with excellent timber, as yet untouched by the hand of man. The distance of transporting this coal, would be 120 miles by the canal, and 18 miles of railroad, in all 138 miles.

If the railroad were finished to this coal, and the canal also completed, the cost delivered at tide water for a ton of this coal would not exceed $3 72.

Thus—For mining per ton - - - -	$ 60
18 miles carriage on railroad, including freight, tolls, and screening, 4 cents per ton per mile, is -	72
Carriage on canal 120 miles, at 2 cents per ton per mile	2 40
Cost per ton, in the District, - - -	$3 72

The toll on the canal is here estimated at one cent per ton per mile, but it will be sound policy to reduce this charge to ½ a cent, in which event this coal would cost at the tide water only $3 12 per ton of 30 bushels, or about 10 cents per bushel.

I feel well satisfied that a proper examination will develop the existence of a second coal field on the waters of the Great Cacapon: its geology and general appearance strongly resembles the second coal formation of Pennsylvania.

Very respectfully, your obedient,

THOS. F. PURCELL.

Hon. C. F. MERCER.

The similarity which marks the chains of mountains, and the direction of the valleys and watercourses of Virginia and Maryland, would have naturally led to the conclusion that the same minerals are common to both States, and will be found to exist under like circumstances. The discovery of anthracite, in Berkley, confirms this conclusion from analogy.

A.

List of counties in Pennsylvania, Virginia, and Maryland, the population of which, in whole or in part, have an obvious interest in the completion of the Chesapeake and Ohio canal.

The Chesapeake and Ohio canal, regarded as a local measure, and exclusive of the interest of the Western States, and especially of Ohio, in every new channel, by which the productions of that region may reach their markets at home or abroad, may be considered as contributing directly to the advancement of the prosperity of the whole, or the far greater part of the population of each of the following counties of Virginia, Maryland, and Pennsylvania, including their cities, towns, and villages.

In Virginia, west of tide water and the Blue ridge, on the Potomac and its branches, counties, population, rivers, and creeks, navigable, or capable of being easily made so.

Augusta	19,925	on the Shenandoah.
Pendleton	6,271	do.
Rockingham	20,693	do.
Shenandoah, Page	19,750	do.
Frederick	26,045	Shenandoah and Opeccon.
Jefferson	12,927	Shenandoah.
Berkley	10,528	Shenandoah, Opeccon, and Back creek.
Morgan	2,692	Sleepy creek, Great and Little Cacapon.
Hampshire	11,279	Great Cacapon, Little Cacapon, the South Branch Patterson's creek, and the North Branch.
Hardy	6,798	Great Cacapon, South Branch, and N. Branch.
	136,908	

In Maryland, the corresponding counties and waters are,

Alleghany	10,602	Savage, Georges, and Wills', Evett's, and Town creeks.
Washington	25,265	Conoloway, Licking, Conococheague, and Antietam creeks.
	35,867	

In Pennsylvania, below the Alleghany mountain, on the branches of the Potomac.

Counties.	Population.	Waters.
Bedford	14,502	Wills', Evett's, Town, Conoloway, and Licking creeks.
Franklin	35,037	The Conococheague and Antietam.
Adams	21,379	The Monocacy river.
	80,918	

To which should be added the following counties west of the Alleghany and east of the Ohio river.

In Virginia—

Brooke	7,040	on the Ohio.
Ohio	15,590	do.
Tyler	5,750	do.
Wood	6,409	do.
Harrison	14,677	on the Monongahela.
Lewis	6,241	do.
Monongalia	14,056	do.
Preston	5,099	on the Cheat river.
Randolph	5,000	on the Valley and Cheat river branches of the Monongahela.
	79,862	

In Pennsylvania—

Alleghany	50,552	Ohio, Monongahela, and Alleghany rivers.
Beaver	24,183	Ohio.
Washington	42,784	Monongahela.
Green	18,028	do.
Fayette	29,172	Monongahela and Youghiogheny.
Somerset	17,762	Youghiogheny and Castleman rivers.
Westmoreland	38,400	Youghiogheny and Monongahela.
	220,881	

To these counties, portions of which are equally, some, more convenient to the Pennsylvania State canal, others might have been added, equally convenient to the Chesapeake and Ohio canal, and many which would desire a choice of markets.

Counties below the Blue ridge, in Maryland and Virginia, and west of tide water, in whole or in part, a part of the produce of which may pass down the Chesapeake and Ohio canal.

In Virginia—

	Population.	Watercourses.
Loudoun	31,938	Goose creek.
Fauquier	26,379	do.
Fairfax	9,206	Potomac.
	57,523	

In Maryland—

Frederick	45,793	Monocacy river.
Montgomery	19,816	Potomac river.
	65,609	

Total population west of tide water.

In Virginia—

9 counties west of the Alleghany - - - -		79,862
11 do between the Alleghany and Blue ridge, - -		136,908
3 do between the Blue ridge and tide water, - -		57,523
Population of 23 counties, - - - - -		274,293

In Pennsylvania—

7 counties west of the Alleghany mountain, - -	220,881
3 do between that mountain and tide water, - -	80,918
Population of 10 counties, - - - -	301,799

In Maryland—

2 counties west of the Blue ridge, - - - -	35,867
2 do east of the Blue ridge, and above tide water, on the Potomac, - - - - -	65,609
Population of 4 counties, - - - - -	101,476

The population of the counties of Virginia, Maryland, and Pennsylvania on the Potomac and its branches, above tide water, and on the Ohio and its branches, east of that river, which may be regarded as directly interested in the Chesapeake and Ohio canal, from their local position, - - - - 677,558

To which, add the following counties of Virginia and Maryland, on tide water:

In Virginia—

Counties.	Population.	Waters.
Prince William	9,330	on the Potomac.
Stafford	9,362	do.
King George	6,397	do.
Westmoreland	8,411	do.
Richmond	6,056	Potomac and Rappahannock.
Lancaster	4,800	do.
Northumberland	7,953	Potomac and Chesapeake bay.
	52,309	- - - - - 52,309

In Maryland—

Counties.	Population.	Waters.	
Baltimore	120,876	Patapsco.	
Anne Arundel	28,165	Patapsco, Patuxent, Severn, South river, and Chesapeake bay.	
Calvert	8,889	Patuxent and Chesapeake.	
Prince George's	20,473	Potomac.	
Charles	17,666	Potomac.	
St. Mary's	13,455	Potomac, Patuxent, & Chesapeake.	
	209,524	- - - - -	209,524

Population of thirteen counties on tide water - -	261,833
Population of thirty-seven counties at the head of, or above tide water - - - - - - - -	677,558
Total population of fifty counties in Pennsylvania, Maryland, and Virginia, which will participate directly in the benefit of the Chesapeake and Ohio canal, as a channel of intercourse for the conveyance of commodities and persons, or indirectly, by its effects, in extending and improving the market for their productions and consumption - -	939,391

To this population, might probably have been added, that of the whole Western country, embracing other portions also of Pennsylvania and Virginia, which will derive, from the opening of this new channel of commerce, a choice of markets; and all the population of all the counties of Virginia and Maryland contiguous to the Chesapeake bay, which cannot but be greatly benefited by whatever may tend to quicken the enterprise, and augment the capitals of the merchants and manufacturers of the cities and towns upon its borders.

Of this population, 180,000 souls to the east of the Alleghany, now residing in cities, towns, and thriving villages, may be expected to consume the coal of the Potomac. But for this commodity, the seaports of the Chesapeake can be regarded as but the *outlet*. The market of consumption is as unbounded, as the country whose population may find the use of this coal necessary or convenient.

The committee, desirous of associating, with the historical narrative of the improvement of the navigation of the Potomac river, the agency of General George Washington, here transcribe from the printed pamphlet containing the charter, by-laws, rules of proceeding, and list of officers of the Chesapeake and Ohio Canal Company, the following memorials of the proceedings of the commissioners of Maryland and Virginia who met at Annapolis in 1784, and of the acts of the latter commonwealth, vesting in George Washington a certain interest in the stock of the Potomac Company, a measure reflecting equal credit upon that commonwealth and her most distinguished son.

For correspondent reasons, they have also added, the description, in a gazette of the day, of the ceremonial attending the commencement of the Chesapeake and Ohio canal.

"*Report of the Commissioners of Virginia and Maryland.*

"At a meeting at the city of Annapolis, on the 22d day of December, 1784, of the commissioners appointed by the commonwealth of Virginia to confer with persons authorized on the part of the State of Maryland, upon the subject of opening and improving the navigation of the river Potomac, and concerting a plan for opening a proper road between the waters of the Potomac and the most convenient Western waters, and a committee appointed by the Senate and House of Delegates of Maryland, to meet the commissioners of Virginia for the purpose aforesaid—were present,

"General Washington and General Gates, from Virginia;

"The Hon. Thomas Stone, Samuel Hughes, and Charles Carroll, of Carrollton, Esquires, of the Senate; and

"John Cadwallader, Samuel Chase, John Debutts, George Digges, Philip Key, Gustavus Scott, and Joseph Dashiell, Esquires, of the House of Delegates.

"General Washington in the chair; Randolph B. Latimer appointed Clerk.

"The conference proceeded to take the subject-matters to them referred, into their consideration, and, thereupon, came to the following resolutions:

"That it is the opinion of this conference, that the removing the obstructions in the river Potomac, and the making the same capable of navigation from tide water as far up the north branch of the said river as may be convenient and practicable, will increase the commerce of the commonwealth of Virginia and State of Maryland, and greatly promote the political interests of the United States, by forming a free and easy communication and connexion with the people settled on the Western waters, already very considerable in their numbers, and rapidly increasing, from the mildness of the climate and the fertility of the soil.

"That it is the opinion of the conference, that the proposal to establish a company for opening the river Potomac, merits the approbation of, and deserves to be patronized by, Virginia and Maryland, and that a similar law ought to be passed by the Legislature of the two Governments, to promote and encourage so laudable an undertaking.

"That it is the opinion of this conference, that it would be proper for Virginia and Maryland each to become subscribers to the amount of fifty shares, and that such subscription would evince to the public the opinion of the Legislatures of the practicability and great utility of the plan, and that the example would encourage individuals to embark in the measure, give vigor and security to so important an undertaking, and be a substantial proof to our brethren of the Western Territory, of our disposition to connect ourselves with them by the strongest bonds of friendship and mutual interest.

"That it is the opinion of this conference, that an act of Assembly of Virginia, 'for opening and extending the navigation of the river Potomac from Fort Cumberland to tide water,' ought to be repealed.

"That it is the opinion of this conference, from the best information they have obtained, that a road to begin about the mouth of Stony river may be carried in about twenty or twenty-two miles to the Dunker Bottom, on Cheat river; from whence this conference are of opinion that batteau

navigation may be made, though, perhaps, at considerable expense. That if such navigation cannot be effected, by continuing the road about twenty miles further, it would intersect the Monongahela, where the navigation is good, and has been long practised.

"That a road from Fort Cumberland to Turkey Foot would be about thirty-three miles, from whence an improvement of the Youghiogeny river would be necessary, though probably it might be done at less expense than the navigation of the Cheat river could be rendered convenient from the Dunker Bottom.

"That it is a general opinion that the navigation on the Potomac may be extended to the most convenient point below, or even above, the mouth of Stony river, from whence to set off a road to Cheat river; and this conference is satisfied that that road, from the nature of the country through which it may pass, wholly through Virginia and Maryland, will be much better than a road can be made at any reasonable expense from Fort Cumberland to the Youghiogeny, which must be carried partly through Pennsylvania.

"That it is the opinion of this conference, that, if the navigation on Potomac should be carried to about the mouth of the Stony river, a communication with the Western waters, through a road from thence, extended even to Monongalia, would be preferable in most points of view to that by a road from Fort Cumberland to Turkey Foot, the only other way practicable, and in any great degree useful; that the communication by a road from Fort Cumberland to the present navigable parts of the Youghiogeny, and thence through that river, though in the opinion of this conference a second object only, would facilitate the intercourse with a very respectable number of the Western settlers, contribute much to their convenience and accommodation, and that the benefits resulting therefrom, to these States, would compensate the expense of improving that road.

"The conference therefore recommended that the Legislatures of Virginia and Maryland appoint skilful persons to view and accurately examine and survey Potomac, from Fort Cumberland to the mouth of Stony river, and the river Cheat, from about the Dunker Bottom to the present navigable part thereof, and if they judge the navigation can be extended to a convenient distance above Fort Cumberland, that they may from thence survey, lay off, and mark a road to the Cheat river, or continue the same to the navigation, as they may think will most effectually establish the communication between the said Eastern and Western waters. And that the said road be cut and cleared not less than eighty feet, and properly improved and maintained in repair, not less than forty nor more than fifty feet wide, at the joint expense of both States; and your conferees beg leave to recommend that each State appropriate three thousand three hundred and thirty-three and one-third dollars for the purpose; and this conference are further of opinion, that the States of Virginia and Maryland request permission of the State of Pennsylvania to lay out and improve a road through such part of that State, as may be necessary, in the best and most proper direction from Fort Cumberland to the navigable part of the Youghiogeny; and, on such permission being obtained, that proper persons be appointed to survey, mark, clear, and improve, such road, at the equal expense of Virginia and Maryland.

"Which are submitted to the consideration of the Legislatures of Virginia and Maryland.

"By order: R. B. LATIMER, *Clerk.*"

An act for vesting in George Washington, Esq. a certain interest in the companies established for opening and extending the navigation of Potomac and James rivers.—[*Passed October*, 1784.]

"1. Whereas it is the desire of the representatives of this commonwealth to embrace every suitable occasion of testifying their sense of the unexampled merits of George Washington, Esq. towards his country; and it is their wish, in particular, that those great works for its improvement, which, both as springing from the liberty which he has been so instrumental in establishing, and as encouraged by his patronage, will be durable monuments of his glory, may be made monuments also of the gratitude of his country:

"2. *Be it enacted by the General Assembly*, That the Treasurer be directed, in addition to the subscriptions he is already authorized to make to the respective undertakers for opening the navigations of Potomac and James rivers, to subscribe to the amount of fifty shares to the former, and a hundred shares to the latter, to be paid in like manner with the subscriptions above mentioned; and that the shares so subscribed, be, and the same are hereby, vested in George Washington, Esquire, his heirs and assigns, forever, in as effectual a manner as if the subscriptions had been made by himself or by his attorney."

An act to amend the act intituled "An act for vesting in George Washington, Esq. a certain interest in the companies established for opening and extending the navigation of James and Potomac rivers."

[*Passed October*, 1785.]

"I. Whereas, by an act intituled 'An act for vesting in George Washington, Esq. a certain interest in the companies established for opening and extending the navigation of James and Potomac rivers,' and reciting 'that, whereas it is the desire of the representatives of this commonwealth to embrace every suitable occasion of testifying their sense of the unexampled merits of George Washington, Esq. towards his country; and it is their wish, in particular, that those great works for its improvement, which, both as springing from the liberty which he has been so instrumental in establishing, and as encouraged by his patronage, will be durable monuments of his glory, may be made monuments also of the gratitude of his country:' It is enacted, 'that the Treasurer be directed, in addition to the subscriptions he is already authorized to make to the respective undertakings for opening the navigations of Potomac and James rivers, to subscribe to the amount of fifty shares to the former, and one hundred shares to the latter, to be paid in like manner with the subscriptions above mentioned; and that the shares so subscribed be, and the same are hereby, vested in George Washington, Esq., his heirs and assigns, forever, in as effectual a manner as if the subscriptions had been made by himself, or by his attorney.' And whereas the said George Washington, Esq., in his letter addressed to the Governor, which has been laid before the General Assembly, hath expressed his sentiments thereupon, in the words following, to wit: 'Your Excellency having been pleased to transmit me a copy of the act appropriating to my benefit certain shares

in the companies for opening the navigation of James and Potomac rivers, I take the liberty of returning to the General Assembly, through your hands, the profound and grateful acknowledgments, inspired by so signal a mark of their beneficent intentions towards me. I beg you, sir, to assure them, that I am filled on this occasion with every sentiment which can flow from a heart warm with love for my country; sensible to every token of its approbation and affection; and solicitous to testify, in every instance, a respectful submission to its wishes. With these sentiments in my bosom, I need not dwell on the anxiety I feel, in being obliged, in this instance, to decline a favor, which is rendered no less flattering by the manner in which it is conveyed, than it is affectionate in itself. In explaining this obligation, I pass over a comparison of my endeavors in the public service with the many honorable testimonies of approbation which have already so far overrated and overpaid them; reciting one consideration only, which supersedes the necessity of recurring to every other. When I was first called to the station with which I was honored during the late conflict for our liberties—to the diffidence which I had so many reasons to feel in accepting it, I thought it my duty to join to a firm resolution to shut my hand against every pecuniary recompense; to this resolution I have invariably adhered—from this resolution (if I had the inclination) I do not consider myself at liberty to depart. Whilst I repeat, therefore, my fervent acknowledgments to the Legislature, for their very kind sentiments and intentions in my favor, and at the same time beg them to be persuaded that a remembrance of this singular proof of their goodness towards me will never cease to cherish returns of the warmest affection and gratitude, I must pray that their act, so far as it has for its object my personal emolument, may not have its effect: but if it should please the General Assembly to permit me to turn the destination of the fund vested in me, from my private emoluments, to objects of a public nature, it will be my study, in selecting these, to prove the sincerity of my gratitude for the honor conferred on me, by preferring such as may appear most subservient to the enlightened and patriotic views of the Legislature.' And whereas the desire of the General Assembly to mark, by the provision above mentioned, their sense of the illustrious merits of the said George Washington, Esq., at the same time that it is strengthened by this fresh and endearing proof of his title to the gratitude of his country, is superseded by their respect for his disinterested wishes and patriotic views:

"II. *Be it enacted*, That the said recited act, so far as it vests in George Washington, Esq. and his heirs, the shares therein directed to be subscribed in his name, shall be, and the same is hereby, repealed.

"III. *And be it further enacted*, That the said shares, with the tolls and profits hereafter accruing therefrom, shall stand appropriated to such objects of a public nature, in such manner, and under such distributions, as the said George Washington, Esq., by deed during his life, or by his last will and testament, shall direct and appoint."

THE FOURTH OF JULY, 1828.

Breaking ground upon the Canal.

Friday last, the Fourth of July, the anniversary of the Declaration of the Independence of the United States, was a proud day for the District of Columbia—for the States interested in an open navigation from the Chesapeake to the Lakes, and to the waters of the Mississippi—for the friends of internal improvement every where.

On that day, which, by concurrent votes of the President and Directors of the Chesapeake and Ohio Canal Company, and the corporations of Washington, Georgetown, and Alexandria, had been fixed upon for breaking ground upon the line of the canal, this interesting ceremony took place in the order prescribed by the committee of arrangements, as heretofore published, which was most successfully carried into effect by Gen. Thornton and Col Stull, marshals of the day, and the aids whom they appointed.

At an early hour the members of the several corporations, and those who were invited to accompany them and the President and Directors of the Canal Company, on this interesting excursion, began to assemble at Tilley's hotel, and cordial greetings were exchanged between them. At half past seven o'clock the President of the United States arrived, escorted by Capt. Turner's and Capt. Tyler's troops of cavalry, under the command of Major Stewart, who politely tendered their services on this occasion, which were found highly useful throughout the day.

Amongst the gentlemen composing the company thus assembled at the invitation of the committee of arrangements, were (besides the President of the United States) the Secretaries of the Treasury, War, and Navy Departments, Mr. Rush, Gen. Porter, and Mr. Southard; the Postmaster General, Mr. McLean; Senators of the United States, Mr. J. S. Johnston and Mr. Bouligny—and Mr. Washington, Representative in Congress; Mr. Vaughan, the Minister of Great Britain to the United States; Baron Krudener, the Minister of Russia, and Baron Maltitz, Secretary of Legation from the same Power; the Chevalier Huygens, Minister from the Netherlands; Baron Stackelberg, Chargé d'Affaires from the King of Sweden; Mr. Lisboa, Secretary of Legation from the Emperor of Brazil; Mr. Hersant, Vice Consul General of France—comprising all the representatives of foreign Powers at this moment in the city, and able to attend. Among the other invited guests was the commander of the army, Gen. Macomb, and Gen. Stuart and Col. Brooke, surviving officers of the revolutionary army. [The invitations were necessarily circumscribed within the limits of the accommodation which the boats procured by the committee of arrangements were calculated to afford. It was a subject of unmixed regret to the committee that the same accommodation could not be extended to all, which they were able to provide for a few only. Besides those invited, a great number of the most respectable citizens of the District and adjoining States either accompanied the procession by water, or kept pace with it by land.]

About eight o'clock the procession was formed on Bridge street, and moved on, to the excellent music of the full band of the marine corps, to High street wharf, where they embarked in perfect order, as previously

arranged, and the boats immediately set forward amidst the cheers of the crowds which lined the wharves.

The steamboat Surprize, followed by two other steamboats and a line of barges and other boats, led the procession up the Potomac, coursing the wild margin of what was once the Virginia shore—still bordered, as when it came from the hands of its Maker, with primitive rocks, and crowned with the luxuriant and diversified foliage of its natural forest. A kindly sky shed its refreshing influence over the water, whose surface the west wind gently ruffled. The sun shone now and then from the clear blue heavens through fleecy clouds. All nature seemed to smile upon the scene. Along the road on the Maryland shore, crowds of moving spectators attended the voyage of the boats, and met the procession on landing above the lower termination of the present canal. On leaving the "River of Swans," as it has been lately happily surnamed, a march of a few hundred yards conducted the company, in the same order in which they embarked, to the canal boats prepared to receive them at the upper bridge across the canal. Seated in these boats, gently gliding along the tranquil stream, like "the swan through the summer sea," the senses of the company were regaled by a scene at once novel and really enchanting. From the banks of this canal of more than forty years' antiquity, there shot up along its entire course a variety of the most beautiful native trees, whose branches, interwoven above, would have excluded the rays of the most piercing sun. Beneath these trees, as far as the eye could penetrate on either side, were seen, in bright luxuriance growing, every species of plant and wild flower recorded in the Potomac Herbal. They looked as if they had never known the footsteps of man, as they refreshed the sight of the voyagers whilst onward each galley moved

"By cliff, and copse, and alder tree."

There was a part of this passage, when the music of Moore's sweet song of "The meeting of the Waters," poured its melody on the ear, so as to suspend the labor of the boatmen, and charm to silence every voice. Noiseless, but in crowds, the people moved forward on the bank of the canal, keeping even pace with the long line of boats, whilst airs, now animated, now plaintive, from the marine band placed in the forward boat, lightened the toil of the walk. As the boats neared the ground destined for the commencement of the canal, the procession discovered, posted on the bank, two companies of riflemen commanded by Captain Thomas and Captain Haller, scarcely to be distinguished, in their uniform of green, from the trees in which they stood embowered, who paid to the President of the United States, both going and returning, the military honors due to his station. The multitude now visibly increased. Thousands hung upon the overlooking hill to the north, and many climbed the umbrageous trees bordering the river and the canal. Perfect order every where prevailed.

On landing from the boats, and reaching the ground, (one or two hundred yards east of the line of the present canal,) the procession moved around it so as to leave a hollow space in the midst of a mass of people, in the centre of which was the spot marked out by Judge Wright, the engineer of the Chesapeake and Ohio Canal Company, for the commencement of the work. A moment's pause here occurred, while the spade, destined to commence the work, was selected by the committee of arrangements, and the spot for breaking ground was precisely denoted.

At that moment the sun shone out from behind a cloud, and, amidst a silence so intense as to chasten the animation of hope, and to hallow the enthusiasm of joy, the mayor of Georgetown handed to Gen. Mercer, the President of the Chesapeake and Ohio Canal Company, the consecrated instrument, which having received, he stepped forward from the resting column, and addressed as follows the listening multitude :

Fellow-Citizens : There are moments, in the progress of time, which are the counters of whole ages. There are events, the monuments of which, surviving every other memorial of human existence, eternize the nation, to whose history they belong, after all other vestiges of its glory have disappeared from the earth. At such a moment have we now arrived. Such a monument we are now to found.

Turning towards the President of the United States, who stood near him, Mr. M. proceeded :

Mr. President : On a day hallowed by the fondest recollections, beneath this cheering (may we not humbly trust, auspicious) sky, surrounded by the many thousand spectators who look on us with joyous anticipation ; in the presence of the representatives of the most polished nations of the Old and New Worlds ; on a spot, where, little more than a century ago, the painted savage held his nightly orgies ; at the request of the three cities of the District of Columbia, I present to the Chief Magistrate of the most powerful republic on earth, for the most noble purpose that was ever conceived by man, this humble instrument of rural labor, a symbol of the favorite occupation of our countrymen. May the use to which it is about to be devoted, prove the precursor to our beloved country, of improved agriculture, of multiplied and diversified arts, of extended commerce and navigation. Combining its social and moral influences with the principles of that happy constitution, under which, you have been called to preside over the American people ; may it become a safeguard of their liberty and independence, and a bond of perpetual union!

To the ardent wishes of this vast assembly, I unite my fervent prayer to that infinite and awful Being without whose favor all human power is but vanity, that He will crown your labor with His blessing, and our work with immortality.

As soon as he had ended, the President of the United States, to whom Gen. Mercer had presented the spade, stepped forward, and, with an animation of manner and countenance, which showed that his whole heart was in the thing, thus addressed the assembly of his fellow-citizens :

Friends and Fellow-Citizens: It is nearly a full century since Berkeley, Bishop of Cloyne, turning towards this fair land which we now inhabit the eyes of a prophet, closed a few lines of poetical inspiration with this memorable prediction :

"Time's noblest Empire is the last :"

A prediction which, to those of us whose lot has been cast by Divine Providence in these regions, contains not only a precious promise, but a solemn injunction of duty, since upon our energies, and upon those of our posterity, its fulfilment will depend. For, with reference to what principle could it be, that Berkeley proclaimed this, the last, to be the noblest empire of Time? It was, as he himself declares, on the transplantation of *learning and the arts* to America. Of learning and the arts. The four first acts—the empires of the Old World, and of former ages—the Assyrian, the Persian, the Grecian, the Roman empires—were empires of

conquest; dominions of man over man. The empire which his great mind, piercing into the darkness of futurity, foretold in America, was the empire of learning and the arts—the dominion of man over himself, and over physical nature—acquired by the inspirations of genius, and the toils of industry; not watered with the tears of the widow and the orphan; not cemented in the blood of human victims; founded not in discord, but in harmony—of which the only spoils are the imperfections of nature, and the victory achieved is the improvement of the condition of all. Well may this be termed nobler than the empire of conquest, in which man subdues only his fellow-man.

To the accomplishment of this prophecy, the first necessary step was the acquisition of the right of self-government by the people of the British North American colonies, achieved by the Declaration of Independence, and its acknowledgment by the British nation. The second was the union of all these colonies under one General Confederated Government—a task more arduous than that of the preceding separation, but at last effected by the present constitution of the United States.

The third step, more arduous still than either or both the others, was that which we, fellow-citizens, may now congratulate ourselves, our country, and the world of man, that it is taken. It is the adaptation of the powers, physical, moral, and intellectual, of this whole Union, to the improvement of its own condition; of its moral and political condition, by wise and liberal institutions—by the cultivation of the understanding and the heart—by academies, schools, and learned institutes—by the pursuit and patronage of learning and the arts: of its physical condition, by associated labor to improve the bounties, and to supply the deficiencies of nature; to stem the torrent in its course; to level the mountain with the plain; to disarm and fetter the raging surge of the ocean. Undertakings, of which the language I now hold is no exaggerated description, have become happily familiar, not only to the conceptions, but to the enterprise of our countrymen. That, for the commencement of which we are here assembled, is eminent among the number. The project contemplates a conquest over physical nature, such as has never yet been achieved by man. The wonders of the ancient world, the Pyramids of Egypt, the Colossus of Rhodes, the Temple of Ephesus, the Mausoleum of Artemisia, the wall of China, sink into insignificance before it—insignificance in the mass and momentum of human labor required for the execution—insignificance in the comparison of the purposes to be accomplished by the work when executed. It is, therefore, a pleasing contemplation to those sanguine and patriotic spirits who have so long looked with hope to the completion of this undertaking, that it unites the moral power and resources—first, of numerous individuals—secondly, of the corporate cities of Washington, Georgetown, and Alexandria—thirdly, of the great and powerful States of Pennsylvania, Virginia, and Maryland—and, lastly, by the subscription authorized at the recent session of Congress, of the whole Union.

Friends and Fellow-laborers: We are informed by the Holy Oracles of Truth, that, at the creation of man, male and female, the Lord of the Universe, their maker, blessed them, and said unto them, be fruitful and multiply, and replenish the earth, *and subdue it*. To subdue the earth was, therefore, one of the first duties assigned to man at his creation; and now, in his fallen condition, it remains among the most excellent of

his occupations. To subdue the earth is pre-eminently the purpose of the undertaking, to the accomplishment of which the first stroke of the spade is now to be struck. That it is to be struck by this hand, I invite you to witness—and in performing this act, I call upon you all to join me in fervent supplication to Him from whom that primitive injunction came, that he would follow with his blessing this joint effort of our great community, to perform his will in the subjugation of the earth for the improvement of the condition of man. That he would make it one of his chosen instruments for the preservation, prosperity, and perpetuity of our Union. That he would have in his holy keeping all the workmen by whose labors it is to be completed. That their lives and their health may be precious in his sight; and that they may live to see the work of their hands contribute to the comforts and enjoyments of millions of their countrymen.

Friends and Brethren: Permit me further to say, that I deem the duty now performed at the request of the President and Directors of the Chesapeake and Ohio Canal Company, and of the corporations of the District of Columbia, one of the most fortunate incidents of my life. Though not among the functions of my official station, I esteem it as a privilege conferred upon me by my fellow-citizens of the District. Called, in the performance of my service heretofore as one of the representatives of my native commonwealth in the Senate, and now as a member of the Executive Department of the Government, my abode has been among the inhabitants of the District longer than at any other spot upon earth. In availing myself of this occasion to return to them my thanks for the numberless acts of kindness that I have experienced at their hands, may I be allowed to assign it as a motive operating upon the heart, and superadded to my official obligations, for taking a deep interest in their welfare and prosperity. Among the prospects of futurity which we may indulge the rational hope of seeing realized by this junction of distant waters, that of the auspicious influence which it will exercise over the fortunes of every portion of the District, is one upon which my mind dwells with unqualified pleasure. It is my earnest prayer that they may not be disappointed.

It was observed that the first step towards the accomplishment of the glorious destinies of our country was the Declaration of Independence. That the second was the union of these States under our Federative Government. The third is irrevocably fixed by the act upon the commencement of which we are now engaged. What time more suitable for this operation could have been selected than the anniversary of our great National festival? What place more appropriate from whence to proceed, than that which bears the name of the citizen warrior who led our armies in that eventful contest to the field, and who first presided as the Chief Magistrate of our Union? You know that, of this very undertaking, he was one of the first projectors; and if, in the world of spirits, the affections of our mortal existence still retain their sway, may we not, without presumption, imagine that he looks down with complacency and delight upon the scenes before and around us?

But while indulging a sentiment of joyous exultation at the benefits to be derived from this labor of our friends and neighbors, let us not forget that the spirit of internal improvement is catholic and liberal. We hope and believe that its practical advantages will be extended to every indivi-

dual in our Union. In praying for the blessing of Heaven upon our task, we ask it with equal zeal and sincerity upon every other similar work in this confederation; and particularly upon that which, on this same day, and perhaps at this very hour is commencing from a neighboring city. It is one of the happiest characteristics in the principle of internal improvement, that the success of one great enterprise, instead of counteracting, gives assistance to the execution of another. May they increase and multiply, till, in the sublime language of inspiration, every valley shall be exalted, and every mountain and hill shall be made low; the crooked straight; the rough places plain. Thus shall the prediction of the Bishop of Cloyne be converted from prophecy into history, and, in the virtues and fortunes of our posterity, the last shall prove the noblest empire of Time.

As the President concluded, a national salute was fired by a detachment of United States artillery, posted upon the ground. As soon as the cheering which followed the close of the President's speech had subsided, the chairman of the committee of arrangements delivered the following brief address:

"In the name of the committee of arrangements of the corporations of the District, I tender to the President and Directors of the Canal Company, and to this crowd of gratified spectators, our congratulations on the happy commencement of this great work.

"To the President of the Company, we and the country are indebted for his early, persevering, and successful efforts in the great cause, the triumph of which we have this day assembled to honor; and we cordially respond to those emotions which the occasion is so well calculated to inspire in his breast.

"To the President of the United States we are under obligations for the kindness and cheerfulness with which he accepted our invitation to practically begin the labor, which is to unite, by closer ties of amity and interest, the inhabitants of the borders of the Atlantic, of the margins of the lakes, and of the rapidly peopling forests and prairies of the interior. In the name of our corporations, we return our acknowledgments to him for the countenance and aid which this undertaking has constantly received from him.

"To the Director from the State of Pennsylvania, who may be considered, in his present relation to us, the representative not merely of his own State, but of the whole West, we offer our cordial felicitation on the prospect of the early completion of the work which has just now been symbolically begun, and of which he too has been the zealous and efficient advocate.

"To the almost unanimous support of the Senators and Representatives of the Western States, united to that afforded by valuable friends from other States, we, of the Atlantic shore, greatly owe the aid which Congress has liberally granted to this undertaking. It is our earnest hope, that, in the advantages to be derived from the opening of this great channel of commerce—from the construction of this great central chain of union—the States of the West will find their most sanguine calculations surpassed by the reality, and that, in the result, the whole sisterhood of States will be made sensible of the benign influence of liberal legislation."

When the chairman had concluded—

Mr. Stewart, (the director referred to above,) after returning his thanks to the committee from the three corporations of the District for the flattering terms in which they had noticed him in the address delivered by their chairman, begged to avail himself of this occasion to tender also his grateful acknowledgments to the stockholders now present for the distinguished and unexpected honor they had conferred on him by calling him from a distant residence to a seat at the Board of Directors. He had, however, to regret that, owing to his very limited experience, he could bring to the Board little more than his hearty good will, and an ardent desire to do every thing in his power to give energy to the prosecution of this great work to a speedy and successful termination—a work pre-eminently national in all its aspects, commenced, as had been well remarked by the President of the company, under the most cheering auspices, by the hands of the Chief Magistrate of the greatest republic on earth, and in the presence of the official representatives of several of the most refined and powerful nations of Europe.

Designated by you, gentlemen, (said Mr. S.) as the representative of the Western States, on this occasion I may venture to tender you their thanks for the just tribute you have paid to the liberal and magnanimous spirit by which they have been governed. I need not say that the people of the West take a deep and lively interest in the success of this great enterprise. They have spoken their sentiments by much higher authority, by their immediate representatives in Congress; for in eight of the nine Western States there was but one vote against the liberal appropriation granted at the last session to this object, and to which we are so greatly indebted for the gratification we all experience on this glorious and joyful occasion.

Looking, as we do, in the West, with intense interest to the accomplishment of this great object, it would be unjust, on this occasion, to withhold the expression of our obligations to our brethren of the East for their liberal support; for in eight of the Eastern States, likewise, there were but eight votes in the House against this appropriation. Our obligations, however, are confined to no section; they belong to the whole Union. Justly regarding this as an object eminently national, the representatives from all portions of our country, influenced by a liberal and enlightened policy, extended to it a generous support. This liberality, however, was not confined to this object alone, but extended largely and freely to others—to Tennessee, to Ohio, to Pennsylvania.

You have very justly, gentlemen, described this as "a great central chain of union between the Atlantic and Western States." I am happy, however, in the conviction that there are other and stronger ties which bind us together—ties of a higher and nobler origin—ties "not made with hands," but found in the hearts, in the affectionate attachment, in the patriotic devotion of the people to the Government and Union of the States. These are the bonds of union, after all, to which we must look, and on which we must rely; these are the bonds which we are called on by every patriotic feeling to cherish, to strengthen, and increase. Every attempt, no matter from what quarter it may come, to dissolve these bonds, to weaken these ties, which bind the people to the Union, to the constitution and laws of their country, should, as it must, meet the indignant reprobation of every true patriot. For should the Union be destroyed, what be-

comes of this fair land, with all its cheering prospects? Where will persecuted liberty longer look for an asylum? Where will the patriot turn his eyes for safety? What becomes of *our bright example* to the friends of freedom throughout the world? Gone! extinguished forever.

But I will dismiss this reflection as inappropriate to the occasion, as an event beyond the reach of anticipation, to which we should never look but to avoid it.

I present you, gentlemen, and all present, the congratulations of the West on this occasion; and permit me to express the hope that we will be able to complete the work, now so happily begun, in three years from this day; and, by a union and co-operation with our friends at Baltimore, when the two works become united on the Potomac river, with a common object and a common interest, may we not indulge the hope that the day is not distant when we shall again assemble, at the summit level, to celebrate an event still more glorious than this—the mingling of the waters of the Chesapeake and Ohio; when we may truly exclaim, without the spirit of prophecy,

"Art's noblest, greatest triumph, is her last."

These addresses being concluded, the spade was taken, and sods of earth dug in succession by the President of the Canal Company, the Mayors of Washington, Georgetown, and Alexandria, the Secretaries of the Treasury, War, and Navy, the Postmaster General, the commander of the army, the revolutionary officers present, the Directors of the Canal Company, and then by a great number of other persons.

After a few moments of repose, the procession again formed, and returned to the boats, and by the way of the canal back to the tide-water, where they re-embarked on board the steamboats.

A cold collation was then partaken of on board the boats, with a relish sharpened by exercise, and by the gratification, free from the least particle of alloy, which the whole excursion and the incidents of the day had afforded to all.

At the table on the deck of the Surprize, the President of the United States being called upon for a toast, gave the following:

"The Chesapeake and Ohio Canal.—Perseverance!"

The President of the Canal Company, on being called upon for a sentiment, gave the following:

"The Constitution of the United States.—The offspring of mutual concession, may it be preserved by mutual forbearance!"

The Secretary of the Treasury being also called on for a toast, gave the following, which only spoke the universal feeling:

"The Chesapeake and Ohio Canal.—May its completion be as productive of public benefits, as its commencement has been of social pleasure."

By this time the steamboats had arrived opposite to Georgetown; and, after lying in the stream a few minutes, proceeded down the river, and swept up to Davidson's wharf, in the city, where most of the passengers were landed, at about half past two o'clock, and the company dispersed to their respective homes with the kindest feelings in themselves and to one another.

Thus ended the most delightful commemoration of this eventful day that we have ever witnessed, and thus auspiciously was begun the work upon the Chesapeake and Ohio canal.—*National Intelligencer*, No. 4,815.

The following act of the last General Assembly of Maryland should have immediately succeeded the resolutions of that body, on the 66th page of this report :

An act in aid of the Chesapeake and Ohio Canal Company.

Be it enacted by the General Assembly of Maryland, That the Treasurer of the Western Shore of Maryland be, and he is hereby, authorized and directed to subscribe, in the name, and on the behalf of this State, for twelve hundred and fifty shares of the capital stock of the Chesapeake and Ohio Canal Company; and to pay for said shares by issuing and delivering to said company certificates of stock of the State of Maryland, bearing interest at the rate of five per cent. per annum, payable semi-annually, and to commence at the end of one year after the sum shall be issued, and redeemable at the pleasure of the State at any time after the lapse of fifteen years, or by disposing of said five per cent. stock, as he shall deem best, and paying the said company, out of the proceeds thereof, the par of said subscription. *And be it also enacted,* That so soon as the Government of the United States shall extend additional aid to the amount of one million of dollars to said company, the said Treasurer shall be, and is hereby, authorized and directed to subscribe, in the name, and on the behalf of this State, for the further number of twelve hundred and fifty shares of said capital stock, and to pay for these shares in like manner.

We hereby certify that the foregoing is a true copy of the original law, passed by both branches of the Legislature, at December session, 1833.

Given under our hands, at the city of Annapolis, this 14th day of March, 1834.

LOUIS GASSAWAY,
Clerk of the House of Delegates of Maryland.
JOSEPH H. NICHOLSON,
Clerk of the Senate of Maryland.

A BILL authorizing a further subscription to the stock of the Chesapeake and Ohio Canal Company.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury be, and he is hereby, authorized and directed to subscribe, in the name and for the use of the United States, for ten thousand shares of the capital stock of the Chesapeake and Ohio Canal Company, and to pay for the same out of the dividends which may accrue to the United States upon their bank stock in the Bank of the United States : *Provided,* That not more than one-half of the sum so subscribed for the use of the United States, shall be demanded in any one year from the passage of this act.

Sec. 2. *And be it further enacted,* That the said Secretary of the Treasury shall, as the proxy of the United States, vote for the President and Directors of the said company, the stock hereby authorized to be subscribed in behalf thereof, according to the number of shares the United States may at any time hold in the said stock, and shall receive and pay into the Treasury of the United States the proportion of tolls upon the said stock, which shall from time to time be due to the United States, and shall have and enjoy, in behalf of the United States, every other right of a stockholder in the said company.

ERRATA.

In the 12th line of the 2d paragraph of page 15, for "1,000," read 1,057.
7th do 3d do from the above, for "1831," read 1832.
10th do 3d do of page 16, the same.
13th do 2d do from the last, the same.
13th line from the bottom of the 30th page, for "3,560,000," read 360,000.
3d line of the 3d paragragh of the 39th page, for "seek," read seeks.
2d do 3d do of the 43d page after "crude" read ore.
On page 191, in the first line of the note, read 5 for "6" feet.
On page 176, strike out the letters in the account prefixed to the figures: they were inserted after the abstract was received, in order to class the expenses.

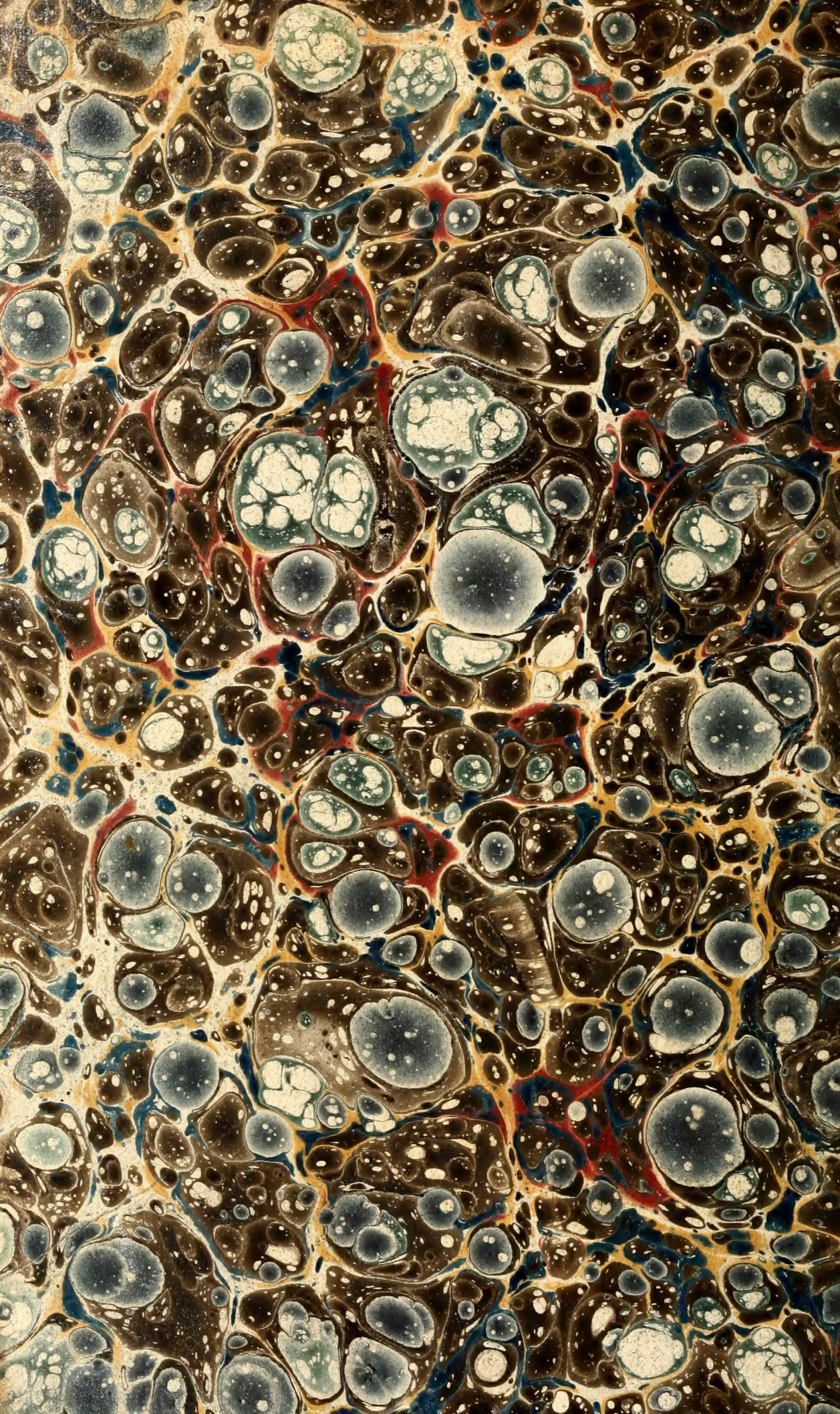
The report and its appendix had been, so far, completed and in the press, when accident brought to the knowledge of the chairman of the committee a recent essay on Canal Navigation, reflecting much light on the question whether canals may be made subservient to speedy travelling and social intercourse, in this age of internal improvement. The author and his numerous experiments corroborate so much, of what, the antecedent note on that part of the report relating to this topic, had suggested to be a possible improvement, in adapting a canal, like that which now extends along the valley of the Potomac, to the important uses above mentioned, that the chairman obtained permission of the committee, to submit to the House of Representatives, on the 14th of May, the following resolution, which being considered on the same day by unanimous consent, was adopted:

CONGRESS OF THE UNITED STATES.

IN THE HOUSE OF REPRESENTATIVES,

May 15, 1834.

On motion of Mr. Mercer,

Resolved, That a late treatise, published in London in 1833, on Canal Navigation, by John Macneill, (omitting the plates,) be added to, and make a part of the Appendix of the Report of the Committee on Roads and Canals, on bill No. 94, authorizing a subscription to the stock of the Chesapeake and Ohio canal.

Attest: W. S. FRANKLIN, *Clerk.*